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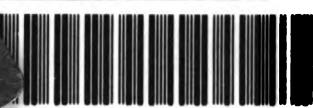
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SAILING DIRECTIONS

FOR THE

PRINCIPAL PORTS ON THE EAST COAST

OF THE

UNITED STATES OF AMERICA.

THIRD EDITION.

1882.



PUBLISHED BY ORDER OF THE LORDS COMMISSIONERS OF THE ADMIRALTY.

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A D V E R T I S E M E N T

TO THIRD EDITION.

THIS work contains Sailing Directions for the principal Ports and anchorages on the East Coast of the United States of America, comprised between Eastport in the State of Maine, and cape Canaveral in the State of Florida.

The present edition has been revised by Staff Commander J. G. Boulton, and Captain J. J. P. Hitchfield, R.N. ; in part from the most recent charts, resulting from the United States Coast survey ; from official Notices ; and from the "Atlantic Coast Pilot," published by the Government of the United States, 1878-79.

F. J. E.

Hydrographic Office, Admiralty, London,
November 1882.

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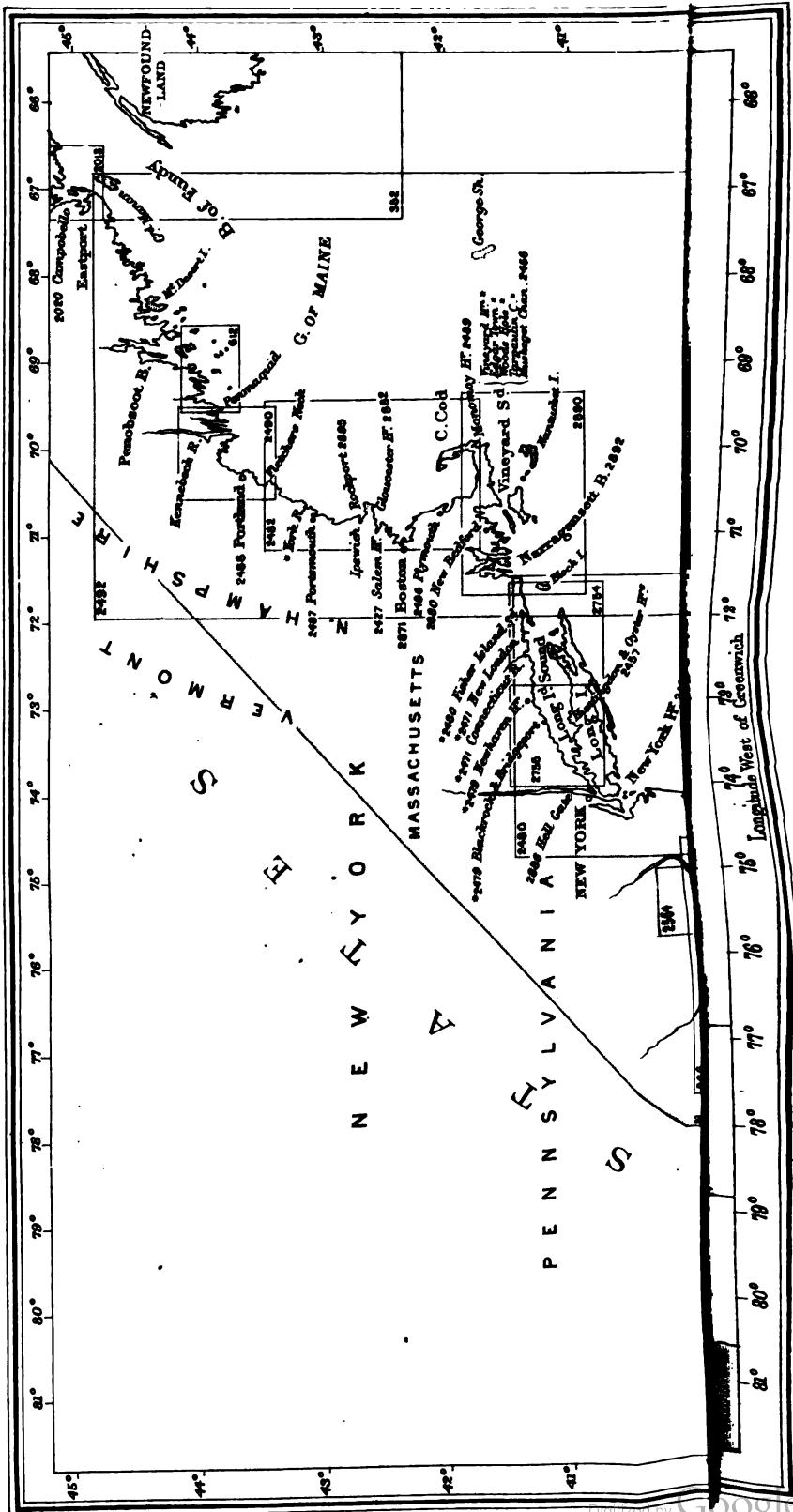
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**IN THIS WORK THE BEARINGS ARE ALL MAGNETIC
EXCEPT WHERE MARKED AS TRUE.**

**THE DISTANCES ARE EXPRESSED IN SEA MILES OF
60 TO A DEGREE OF LATITUDE.**

**ONE CABLE IS ASSUMED TO BE EQUAL TO
100 FATHOMS.**

**THE SOUNDRINGS ARE REDUCED TO THE DEPTHS OF LOW
WATER OF ORDINARY SPRING TIDES.**



SAILING DIRECTIONS
FOR THE
PRINCIPAL PORTS ON THE EAST COAST
OF THE
UNITED STATES OF AMERICA.

CHAPTER I.

PASSAMAQUODDY BAY TO NEWPORT HARBOUR.

VARIATION IN 1882.

Passamaquoddy bay	$18^{\circ} 40' W.$		Cape Cod	-	$12^{\circ} 0' W.$
Kennebec river	- $14^{\circ} 0' W.$		Newport harbour	-	$10^{\circ} 20' W.$

MAINE.—The largest of the New England States, and the most easterly of the United States of America, is about 250 miles in length from north to south, and 190 in breadth from east to west, including an area of about 30,000 square miles. Along the coast from 10 to 20 miles inland there are some small and marshy plains. Mount Desert island (*see* page 17) may be seen from seaward, a distance of 50 or 60 miles.*

The population of the State of Maine in 1880 was 648,545.

Climate.—The winters in the State of Maine are long and severe, but free from those frequent changes that prove so deleterious to health in the States farther south, the summers are short, scarcely lasting four months. The N.E. winds from the Atlantic, in the spring and early summer, charged with fog and chilliness, are among the most unpleasant and unhealthy features of the climate in this State.

Coast.—The seaboard of the State of Maine is indented by numerous bays and inlets with several outlying islands, rocks and shoals, and nearly all the rivers are navigable for ships, from 12 to 50 miles from the sea.

BANKS IN THE GULF OF MAINE.—Jeffrey Bank, the shoalest water over which is 37 fathoms, is 11 miles long in an E.N.E. and W.S.W. direction. The east and west extremes, bear respectively,

* *See Admiralty charts* :—North Atlantic ocean, general, No. 2,059; scale $d=0.3$ of an inch; North Atlantic ocean, Western portion, No. 2,060b; scale, $d=0.5$ of an inch; Halifax to the Delaware, No. 2670; scale, $d=3.4$ inches; and bay of Fundy to Block Island sound, No. 2,492; scale, $m=0.1$ of an inch.

S.S.E. $\frac{1}{4}$ E. distant 25, and South 26 miles from Matinicus rock lighthouses; the centre of the bank bearing S.W. distant 38 miles from Mount Desert rock lighthouse. The shoalest water lies near the western extremity.

Platt bank, with 29 fathoms over a bottom of coarse sand and broken shells, is 9 miles long in an E. by S. and W. by N. direction, and 4 miles broad. The eastern extremity, is in lat. $43^{\circ} 7' N.$, long. $69^{\circ} 30' W.$

Jeffrey ledge.—Not to be confounded with Jeffrey bank alluded to above—is an extensive shoal, lying off the coasts of Maine, New Hampshire, and Massachusetts; being 40 miles long in a N.E. and S.W. direction, with 18 to 40 fathoms water over it. The bottom is composed of grey, red, and black sand, red gravel, black pebbles and mud. The south-west extremity, bears E. by S. $\frac{1}{2}$ S. distant 4 miles from cape Ann (Thatchers island) lighthouses and the north-west extremity, S. $\frac{3}{4}$ E. distant 25 miles from cape Elizabeth lighthouses. A vessel steering for cape Ann, from cape Sable will cross Jeffrey ledge in lat. $42^{\circ} 39' N.$, long. $70^{\circ} 25' W.$, and when the bottom changes to grey or dark mud, she will be westward of the ledge, and cape Ann (Thatcher island) lighthouses, should bear W. $\frac{1}{2}$ N. distant $4\frac{1}{2}$ miles.

CASHES LEDGE lies on the course, between cape Sable and cape Ann, and between the depths of 25 fathoms, is 16 miles long in a N. by E. and S. by W. direction. The shoalest part is a flat white rock, with 4 fathoms least water over it named Ammens rock, situated about 5 miles from the south-west extreme of the ledge. Ammens rock, lies in lat. $42^{\circ} 56' N.$ long. $68^{\circ} 51\frac{1}{2}' W.$ and bears S. by W. $\frac{1}{2}$ W. 51 miles from Matinicus rock lighthouse, and E. $\frac{1}{4}$ S., distant 78 miles from cape Ann lighthouses.

A rock, with 5 fathoms over it, is situated 4 miles south-westward from Ammens rock, in lat. $42^{\circ} 52' 40'' N.$, long. $68^{\circ} 54' 30'' W.$

Fippenies ledge, with 39 fathoms, gravel, sand and broken shells, has a diameter of 5 miles, and is situated 15 miles westward of Cashes ledge; the centre bearing E. $\frac{5}{8}$ S., distant 58 miles from cape Ann lighthouses, and N.E. $\frac{3}{4}$ E., the same distance from cape Cod (Highlands) lighthouse.

GEORGE BANK (sometimes named Stellwagens shoal ground), within the depth of 20 fathoms, is 70 miles long in a north-east and south-west direction, with a maximum breadth of 40 miles. It is situated between the parallels of 41 and 42 degrees north, and between the meridians of $67^{\circ} 15'$ and $68^{\circ} 30'$ west, and 70 to 120 miles eastward from the nearest part of Nantucket island, and cape Cod peninsula. There are several shoals on this bank with less than 12 fathoms water over them.

George Shoal, or the Georges, is the most dangerous shoal on George bank, having only 12 feet water over its shoalest part. George shoal, within the depth of 8 fathoms is 15 miles long in a N. by W. and S. by E. direction, and 3 miles broad. The shoalest part lies on the eastern edge, and midway between its north and south extremes, being in lat. $41^{\circ} 39'$ N. and long. $67^{\circ} 42'$ W. Another shoal with 13 feet water, lies N. by W. $\frac{1}{4}$ W. 6 miles from this last position, and the north extreme of George shoal, with a depth of $4\frac{1}{2}$ fathoms over it, is situated in lat. $41^{\circ} 47'$ N. long. $67^{\circ} 46'$ W., bearing E. by S. $\frac{7}{8}$ S., distant 100 miles from cape Cod lighthouse.

The south extremity of George shoal, with a depth of 8 fathoms lies in lat. $41^{\circ} 34'$ N. and long. $67^{\circ} 37'$ W.*

Cultivator shoal, the next in importance, has 3 fathoms water over it, and lies W. $\frac{1}{2}$ N. distant 20 miles from the shoalest part of George bank, and S.E. by E. $\frac{3}{4}$ E. 88 miles distant from cape Cod lighthouse.

A shoal, with $5\frac{1}{4}$ fathoms water over it, is situated on the south-west part of George bank, bearing S.W. by W., distant 41 miles, from the shoalest part of George shoal, and E. $\frac{1}{4}$ N., 45 miles, from Fishing Rip, the nearest of Nantucket shoals.

Directions for passing George bank. — Wishing to pass north-west of George bank, and between it and Nantucket shoals; with cape Sable lighthouse bearing North distant 10 miles, steer S. 60° W. (true), passing 26 miles northward of the shoalest part of George shoal, in 100 to 110 fathoms, blue mud; and 23 miles northward of Cultivator shoal, in 90 to 100 fathoms, dark mud and gravel, alternating with blue mud and sand. When in latitude $41^{\circ} 49'$ N. and longitude $68^{\circ} 48'$ W. with a depth of 80 fathoms, green mud, the course should be altered to S. 18° W. (true), passing 30 miles west of Cultivator shoal, in 70 to 80 fathoms over green mud and fine sand, which depth will continue until in lat. $41^{\circ} 22'$ N., when the depth will diminish; 41 fathoms over coarse gray sand and broken shells being found in lat. $41^{\circ} 13'$ N., long. $69^{\circ} 0'$ W. Southward of this position, the soundings will vary from 30 to 40 fathoms.

The above courses lead east of Phelps bank, and Fishing Rip. If wishing to pass westward of these banks; when in lat. $41^{\circ} 49'$ N., long. $68^{\circ} 48'$ W., steer S. 38° W. (true), gradually diminishing the depth, until in lat. $41^{\circ} 12\frac{1}{2}'$ N. long. $69^{\circ} 24'$ W., where the depth will be 23 fathoms, over white sand and broken shells. From this position, the course is

* A depth of 12 fathoms reported in lat. $41^{\circ} 2'$ N., long. $66^{\circ} 53'$ W. (approximate).
Annonce Hydrographique, No. 96 of 1882.

S.W. by W. $\frac{3}{8}$ W., and distance 26 miles to Nantucket New South shoal light vessel, crossing the south tail of Davis bank in 6 fathoms. From the light vessel, follow the directions given in page 66.

To pass south-eastward of George bank.—With cape Sable lighthouse bearing North distant 10 miles, as before, steer S. 32 W. (true), which will lead 32 miles south-eastward of the shallowest part of George shoal, in 23 to 30 fathoms, white fine sand. When in lat. $41^{\circ} 18' W.$, long. $67^{\circ} 11' W.$, with a depth of about 25 fathoms, fine white sand, the course should be altered to S. $68^{\circ} W.$ (true), carrying from 25 to 39 fathoms, over bottoms of fine white sand, pebbles and white sand, and fine dark sand and gravel, until, in lat. $40^{\circ} 40' N.$, long. $69^{\circ} 19' W.$, whence follow the directions given in page 65, for passing east of Nantucket shoals. If on the above courses, there are no shells, it indicates that the vessel is sufficiently far to the southward and eastward, to avoid George shoal, and the strong tides which exist in its vicinity.

In passing north-westward of George bank, do not shoal to less than 75 fathoms, blue mud, which will lead well northward of George bank.

TIDAL STREAMS.—It is high-water, full and change, at George shoal, at 10h. 30m. (approximate), the mean rise and fall being about 7 feet.

As a general rule, between Nantucket shoals and cape Sable, the ebb, or southerly stream runs to the southward during the first $4\frac{1}{2}$ hours, and the flood or northerly stream, from the 6th to the 11th hour following the moon's superior, and inferior meridian passages. The average velocity of each stream is one knot per hour, being greater in the shallow, and less in the deep water. The times of turning of the flood or northerly, and ebb streams correspond with the times of high and low water respectively at Boston and Portland. Westward of George bank the stream turns half an hour later, and eastward of the same, half an hour earlier. Between George bank and Nantucket shoals, the flood stream commences at 5h. 37m. after the time of the moon's meridian passage running for the first $1\frac{1}{2}$ hours in a N. $\frac{1}{2}$ W. direction, with a velocity of one knot per hour. For the next 3 hours, the direction is N. by W., at the rate of $1\frac{1}{2}$ knots, and during the last quarter N. by W. one knot. At 11h. 55m. after the moon's meridian passage the ebb stream commences, running S. $\frac{1}{2}$ W. for the first quarter, at the rate of one knot; S. by W. $\frac{3}{4}$ W. at the rate of $1\frac{1}{4}$ knots for the next 3 hours, and W.S.W. one knot per hour during the remaining quarter.

On the southern edge of George bank, at 5h. 7m. after moon's meridian passage, the northerly stream runs N.W. $\frac{1}{2}$ W. $1\frac{1}{2}$ knots for the first $1\frac{1}{2}$

hours. It then runs N. by W. at the rate of 2 knots for the next 3 hours, and N.E. $1\frac{1}{2}$ knots per hour for the remaining $1\frac{1}{2}$ hours, turning to the southward at 11h. 19m. after the moon's meridian passage and running S.E., $1\frac{1}{2}$ knots per hour for the first quarter. For the next 3 hours its direction is S. $\frac{1}{2}$ E. 2 knots, and S.S.W. $1\frac{1}{2}$ knots for the remaining quarter. Between George and Brown banks, the direction and rate of the northerly stream is as follows:—Commencing at 5h. 2m. after moon's meridian passage its runs N.W. $\frac{1}{2}$ W. one knot during the first quarter, N.N.W. $1\frac{1}{4}$ knots, the second and third, and N. $\frac{1}{2}$ E., one knot during the last quarter. At 10h. 50m. after moon's meridian passage the southerly stream has made, setting S.E. at the rate of $1\frac{1}{4}$ knots, for the first $1\frac{1}{2}$ hours, S.E. $\frac{3}{4}$ S. $1\frac{1}{4}$ knots during the next 3 hours, and S. by E. one knot for the last $1\frac{1}{2}$ hours.

The above times may be 22 minutes too early, or late, and the rates too small, or large, by one-fifth owing to the tidal irregularities.

Strong and well defined tide ripples and overfalls, during the strength of both streams, will be found between the parallels of 42° and 43° N., and between the meridians of $66^{\circ} 30'$ and $68^{\circ} 30'$ W.

These occur in extensive patches of 20 to 40 miles long, by at least 10 in breadth, looking very much like shoal breakers.

A relation seems to exist between the tidal streams and the swell, the latter having been observed to increase regularly with the flood or northerly, and subside with the ebb or southerly stream.*

PASSAMAQUODDY BAY† is an extensive inlet about 10 miles deep, common to New Brunswick and the State of Maine. On the

* Mr. W. Watson, for twelve years in command of Messrs. Cunard's steam ships, remarks that he has never experienced any south-westerly current on his voyages to New York, after passing westward of the meridian of 66° W. His custom was to cross this meridian in lat. $41^{\circ} 20'$ N., and steer S. 78° W. (true), to a position in lat. 41° N., long. 68° W.; in fine weather, altering course to S. 84° W. (true), passing north of Phelps bank, to a position 6 miles south of Nantucket New south shoal light vessel. The course was then S. 86° W. (true), until 8 miles south of Great West or Shinnecock bay lighthouse, and thence to Sandy Hook light vessel.

In thick weather, his practice was to continue the S. 78° W. (true), course, passing south of Phelps bank, until in lat. $40^{\circ} 40'$ N., long. 70° W., with Nantucket New South shoal light vessel, bearing N.N.E. $\frac{1}{2}$ E., distant 16 miles, thence steering N. 89° W. (true), to the position before mentioned, southward of Great West or Shinnecock bay lighthouse.

† See Admiralty charts:—Bay of Fundy, sheet 1, No. 352; scale, $m=0\cdot3$ of an inch; Grand Manan island, No. 2,539, scale, $m=1\cdot2$ inches; Campobello island, No. 2,020, scale, $m=2\cdot0$ inches; and Pemaquid point to Fletchers neck, No. 2,490; scale, $m=0\cdot9$ of an inch; Quoddy Head to cape Lepreau, No. 2,013; scale, $m=0\cdot5$ of an inch.

western side of the bay is the river St. Croix, being the natural boundary between British America and United States territory.*

The bay—which is never closed by ice—affords good shelter with a sufficient depth of water for ships of the heaviest burthen, whilst its waters abound with fish, comprising herring, cod, and mackerel.

Across the entrance of the bay, about 10 miles wide, are numerous islands, rocks, and shoals, between which are three channels, viz., the Southern, the Middle or Ship channel, and the Northern, known as Letite passage. The first, barely a cable wide across the narrows, is that between Campobello island and the mainland to the south-west ; the Ship channel lies between Campobello and Deer islands, and though the most circuitous, is the broadest, deepest and best; whilst Letite passage, between Macmaster island and the new Brunswick shore, is narrow and dangerous, being only available with local knowledge and during slack tide.

Campobello island, nearly 8 miles in length, is for the most part in a state of cultivation, and has several good harbours, especially that of De Lute on its north-west shore. The island is only a cable distant from the town of Lubeck, which stands on a small tongue of land in the State of Maine, and by referring to the chart it will be seen that this channel is only available at a certain time of tide, to suit a vessel's draught, and as at all times local knowledge must be indispensable, a detailed description of its dangers is unnecessary.

With the exception of the south-west shore the salient points of the island are steep-to and may be safely approached to one or 2 cables. On the eastern coast Herring bay, Schooner, and Mill coves are well adapted for temporary anchorages; but when making for the latter care must be taken to avoid a three-quarter fathom patch about 2 cables off the north shore of the cove.

EASTPORT.—The summer anchorage of Eastport is known as Friar road, and is situated between Campobello island, and Moose island on the south-east side of which stands the town of Eastport. This anchorage is exposed to the north-east and is not safe during a gale from

* In November 1817 the Commissioners appointed by the respective Governments, under the Treaty of Ghent (the last treaty of peace in 1814) decided that Moose Dudley, and Frederick islands, in the bay of Passamaquoddy, do belong to the United States; and that all other islands in the bay, as well as Grand Manan island in the bay of Fundy, do belong to Great Britain, in conformity with the treaty of peace of 1783.

And further that the navigable waters of the bay of Passamaquoddy are common to both parties for the purpose of all lawful and direct communication with their own territories and foreign parts.

that quarter. Broad cove on the south side of Moose island, affords good anchorage in 7 to 8 fathoms, water, sheltered from all winds, and easy of access.

Tides.—It is high water, full and change, at Eastport, at 11h. 8m.; springs rise 19 feet, neaps 16 feet.

Directions.—Vessels bound to Eastport should proceed through the channel between Campobello, and Deer islands; on approaching this channel from the eastward East Quoddy head (the north-east extreme of Campobello island) which is a rocky, precipitous head-land covered with stunted trees, and a rocky islet about 30 feet high just clear of the head with a lighthouse on it, will be seen; pass at a distance of 2 cables north of the islet, then steer to the south-west keeping about a quarter of a mile from the Campobello island shore, and anchor either in Friar road abreast Eastport or proceed to the anchorage in Broad cove.

WEST QUODDY HEAD, the easternmost point of the sea-coast of Maine and the south entrance point of Lubeck narrows (southern channel leading to Eastport) is high, and wooded, with the exception of the summit, which has on it only decayed stumps of trees.

LIGHT.—The lighthouse which stands near the eastern extremity of West Quoddy head, is painted with red and white horizontal stripes, and exhibits at an elevation of 133 feet above high-water, a *fixed* white light which should be seen in clear weather from a distance of 17 miles.

Fog signal.—At a distance of 80 feet south-west from the lighthouse stand two fog-signal houses, from which during foggy weather a steam whistle is sounded for *eight seconds* at intervals of *fifty-two seconds*.

Should the fog whistle be disabled, a bell will be rung.

A life boat is stationed at West Quoddy head.

Tides.—It is high water, full and change, at West Quoddy head, at 11h. 12m.; springs rise 21 feet, neaps 17 feet.

Sail rock situated about a quarter of a mile S.S.E. from West Quoddy head lighthouse has two small rocks on its east side with a reef of sunken rocks between. Eastward of these rocks there is a heavy race, and when passing this locality it would be advisable not to approach Sail rock nearer than three-quarters of a mile.

Little River harbour situated 14 miles S. W. by W. $\frac{1}{4}$ W. from West Quoddy head, extends about $1\frac{1}{2}$ miles in a N. W. by W. direction, and is frequently resorted to as a harbour of refuge. Eastern Knubble the north entrance point of the harbour is high, precipitous, and rocky, with a few trees on it; Little River head the south entrance point is

moderately high, having on the south and east sides, large, white patches painted on the rocks just below the tops of the cliffs.

Little River island in the middle of the entrance, is small and rocky, with a thick growth of stunted fir on top ; there are white patches painted on the rocks of Little River island ; the main channel leading into Little River harbour, lies between this island and Eastern Knubble, and the western channel, which has only 8 feet water, between the island and Little River head.

Anchorage.—The best anchorage in Little River harbour, is in 4 or 5 fathoms, stiff mud, abreast the town of Cutler, just above Ackley's point.

LIGHT.—On the north-west side of Little River island, stands a lighthouse, painted white, from which is exhibited at an elevation of 40 feet above high water, a *fixed* white light, varied by a *flash* every minute and a half, this light should be visible in clear weather from a distance of 11 miles.

Fog signal.—During foggy weather a bell is sounded at intervals of *thirty seconds*.

MACHIAS BAY, situated 5 miles W. by S. from Little River head, is 6 miles long, and $2\frac{1}{2}$ to 4 miles wide, receiving on the north-west side the waters of Machias river. The town of Machiasport, is situated on the western bank of the river, and 4 miles below the city of Machias, which has a large lumber trade, and some ship building establishments. Only 15 feet can be carried at mean low water to Machiasport, but good, sheltered anchorage, in 3 to 6 fathoms may be obtained in Bucks harbour, on the west shore of the bay and about 4 miles northward of Libby islands.

Cross island situated on the eastern side of the main entrance to Machias bay, is 2 miles long east and west, $1\frac{1}{2}$ miles broad, and steep to on its south side, from its south-west end a reef (Cross island ledge) extends nearly $1\frac{1}{2}$ miles in a westerly direction. There are three small islets near its eastern shore, the northernmost named Scotch island lies on the south side of the entrance to Cross island narrows, which is about half a mile wide, and should not be used unless with local knowledge.

Libby islands are two rocky islands on the western side of the main entrance to Machias bay, at 2 miles W.S.W. from Cross island, lying north-east and south-west from each other ; these islands are nearly joined by reefs at low-water.

LIGHTS.—Libby island.—On the south-western Libby island stands a gray tower 35 feet high, which exhibits from an elevation of 52 feet above high water, a *fixed* white light, visible 12 miles.

Fog signal.—During foggy weather a bell is sounded, *six times every minute.*

Avery rock.—This lighthouse stands upon the rock of that name, situated in the northern part of Machias bay, and near the entrance to Machias river. The square white tower, surmounts the keeper's dwelling of the same colour, and exhibits from an elevation of 68 feet above high water, a *fixed red* light, visible 14 miles.

Fog Signal.—In foggy weather, a bell is sounded, giving *two strokes* in quick succession, alternately with a *single stroke*, at intervals of *thirty seconds.*

DANGERS in Main channel.—**Cross island ledge, or South-west ledge**, which extends from the south-west extreme of Cross island, is marked by a red can buoy in 7 fathoms. The greater portion of this ledge dries at half ebb.

Stone island ledge, dry at low water, is a detached rock, lying $1\frac{1}{2}$ cables from the south extreme of Stone island, and has erected upon it a black cage beacon.

Sea-shore ledge, dry at low water, extends a quarter of a mile from Howard point situated on the west side of the bay, and $1\frac{1}{4}$ miles southward from Bucks harbour. Its south-east extreme is marked by a black spar buoy, placed in 5 fathoms, between which and Bucks harbour the shore is foul.

A rock with 3 fathoms water on it, is reported to lie E.S.E. about one mile distant from Bucks harbour.

A sunken rock, is said to lie W.N.W., about one mile from Northern harbour in Cross island.

Directions.—Main channel.—Bring Stone head, a conspicuous white bluff on Stone island, situated about a mile northward of Libby islands, to bear N.W., and steer for it on that bearing, until the lighthouse on Libby island opens north of the north-eastern of those islands, whence steer N.N.E. for Avery rock lighthouse. When Bucks harbour is open, steer for it, passing northward of a small islet at the entrance, the outer of Bucks head ledges. Proceed through the middle of the passage for Bucks Neck, and anchor in 3 to 6 fathoms in Outer Bucks harbour.

A lifeboat is stationed at Cross island.

Ice.—In severe winters, Machias bay is usually frozen entirely over from the latter part of January until that of February. To sailing vessels, navigation is rendered difficult during the months of January, February, and March.

ENGLISHMAN BAY is contained by Cow point on the east, and Kelly point on the west, being fronted by numerous islands, lying between Libby island, and Mistake island (the southernmost of the Head harbour group) situated W.S.W., distant 9 miles from it. The bay affords anchorage for all classes of vessels, in various parts, but the best shelter for vessels of moderate draught, is in the northern part of the bay, under the north side of Roque island, which may be approached on either side, but the eastern side is the clearest of danger.

LIGHT.—Mouse peak.—This lighthouse usually known as Head harbour, and sometimes as Moos-a-bec lighthouse, is erected on Mistake island, which forms the southern side of Head harbour. It is a white tower, 40 feet high, exhibiting from an elevation of 65 feet above high water, a *flashing* white light, the intervals between the *white flashes* being *half a minute*. The light is visible 13 miles, except between the bearings of S.E. by E. and S.E. $\frac{1}{2}$ S.

An automatic whistling buoy is moored S. by E. distant 2 miles from Moose peak lighthouse.

Roque island situated near the middle of Englishman bay is $1\frac{3}{4}$ miles long north and south, and $1\frac{1}{2}$ miles broad, the north-east point of this island is a high wooded hill, terminating in a rocky bluff, named Great head, a prominent land mark for vessels entering Englishman bay from the eastward. Squire point the north-west extreme of the island is low flat, and grassy, backed by thin woods; from this point a ledge dry at low water, named Squire point ledge extends a quarter of a mile in an easterly direction. This is the only danger in the eastern passage from seaward; in the western approach are the following:—

Eastern ledges, are two rocks $1\frac{1}{2}$ cables apart, the eastern of which is dry at low water, and bears E. by S. $\frac{1}{2}$ S. distant one mile from Mark island.

Parker bar, with very little water over it, extends W.S.W. a quarter of a mile from the shore, a short distance northward of Parker head, the south-west extreme of Roque island.

Directions.—East of Roque island.—Having made Libby islands, steer to pass midway between Scabby, and the Brothers islands; thence N.W., which will lead in mid-channel, to the anchorage under the north shore of Roque island.

West of Roque island.—Pass either side of the whistling buoy, moored southward of Mistake island, and giving the east shore of Head harbour island a fair borth, steer for the east extreme of Mark island, bearing N.N.W. $\frac{1}{2}$ W., until within the distance of 4 cables. From this position

steer N. $\frac{1}{2}$ E. until near Parker head, whence haul to the westward to avoid Parker bar, and procure the assistance of a pilot.

Ice.—Englishman bay, in ordinary winters is difficult to navigate, between the 1st of January and 1st of March; and in severe winters between the months of December and April.

Tides.—It is high water, full and change, in Englishman bay, at 11h. 15m. (approximate); the mean rise and fall being 13 feet.

MOOS-A-BEC REACH, is contained between Kelly point on the east and cape Split on the west, and is partially sheltered from seaward by the numerous islands, which lie between Mistake and Nash islands. This passage is much frequented by coasters, there being 15 feet at low water on the bar near Kelly point.

The best anchorage for large vessels in this vicinity, is on the west side of Great Wass island, between Slate, Ram and Beal islands. Browney island is situated half a mile northward from Fisherman island, the south extreme of which bears S.E. by E. $\frac{1}{2}$ E. distant 6 miles from Nash island.

FISHERMAN ISLAND PASSAGE.—There are several channels between the numerous islands on the south side of Moos-a-bec reach which may be used in case of necessity, care however is necessary to avoid the ledges that partially obstruct these channels. Fisherman island passage, the easternmost and best approach to the above anchorage, leads between Crumple, Fisherman, Browney, Ram, and Norton islands on the east, and Outer sand, Inner sand, Drisco and Steven islands, and Duck ledges on the west; this passage is tolerably wide, with not less than $5\frac{1}{2}$ fathoms water, throughout, until abreast Harwood island where depths of 16 feet will be obtained.

LIGHT.—**Nash island** is nearly two cables in diameter and joined at low water to Cone island. It lies south of Pleasant bay, and at the west extreme of Moos-a-bec Reach. On its summit is erected a white tower, surmounting the keeper's dwelling, which exhibits at an elevation of 47 feet above high water, a *fixed red* light, visible 12 miles, when bearing from N.W. by N. (round north and east) to S.W. by W.

Dangers in Fisherman island passage.—On the east side, are the following dangers, with their bearings and distances from the north extreme of Browney island:—Sea-horse rock, dry at half ebb, S.W. $\frac{3}{4}$ S., $1\frac{2}{3}$ miles, Western Egg rock, dry at half ebb, S.W. $\frac{1}{2}$ S., one mile, Browney island ledges, N. by W. $\frac{1}{4}$ W., half a mile. Old Bachelor, above high water, N. by E. three quarters of a mile.

On the west side of the passage, are the following dangers, with their bearings and distances from the north extreme of Browney island:—Stanley ledge, just above high water, W. $\frac{1}{2}$ N., 2 miles. Corn ledge, with 9 feet water on it, N.W. by W. $\frac{1}{4}$ W. $1\frac{1}{2}$ miles.

Directions.—With Nash island lighthouse bearing N.W. $\frac{1}{4}$ N., distant $4\frac{3}{4}$ miles, and the south extreme of Crumple island, (which almost joins the south extreme of Fisherman island), bearing E. by N. $\frac{1}{4}$ N., distant $2\frac{1}{2}$ miles; steer N.N.E. between the dangers above described, until the north point of Browney island bears E. by S. $\frac{1}{2}$ S., thence N.E., and after passing between Slate and Ram islands, anchor as convenient in 3 to 7 fathoms.

A life boat is stationed at Browney island.

Ice.—Moos-a-bec Reach is rarely closed to navigation by ice, but in the severe winter of 1874-75, the movements of sailing vessels, were rendered dangerous between 28th of January and 21st of March.

Tides.—It is high water, full and change, at Jonesport, in the eastern part of Moos-a-bec Reach, at 10h. 58m.; springs rise $12\frac{1}{2}$ feet, neaps $11\frac{1}{2}$ feet.

CAPE SPLIT HARBOUR, situated N.E. $\frac{3}{4}$ N., distant 2 miles from Nash island lighthouse, and half a mile eastward from cape Split, affords safe anchorage, for vessels of heavy draught, with all but south-west winds, and small vessels may moor N.W. and S.E. in not less than 3 fathoms in Tabbott cove, situated on the east side of the harbour, and sheltered from all winds.

Directions.—**Cone island passage.**—With the western entrance point of Cape Split harbour, bearing N. $\frac{1}{4}$ E., distant 3 miles, a vessel will be about half a mile westward of the south extreme of Flat island ledges, in 16 fathoms water, when a N. $\frac{1}{4}$ E. course should be steered until the north extreme of the Ladle bears S.W. by W. $\frac{1}{2}$ W. distant 4 cables, thence N.N.E. for the harbour, anchoring as convenient within the entrance.

NARRAGUAGUS BAY.—Pond island conspicuous by its conical summit and lighthouse, is situated $3\frac{1}{2}$ miles westward of Nash island, and between them is the common entrance to Pleasant and Narraguagus bays. The latter contains good anchorage in 3 to 5 fathoms, under the north side of Trafton island, situated in the middle of the bay. Beyond this, strangers should take a pilot. The town of Millbridge is situated $4\frac{1}{2}$ miles northward from Pond island, whence supplies and water may be obtained. Ship's Stern island, indicated by its name, and a useful steering mark, lies $1\frac{1}{2}$ miles north-westward from Nash island.

LIGHT.—**Narraguagus.**—This lighthouse is erected on the south-east extreme of Pond island. Its white tower, surmounting the keeper's dwelling of the same colour, exhibits at an elevation of 45 feet above high water, a *fixed* white light, visible 12 miles.

Fog signal.—In foggy weather, a bell is sounded, in answer to signals from passing vessels.

DANGERS.—**Jordan's Delight ledge**, a sunken reef, marked by a red spar buoy, extends one mile southward from Jordan's Delight, a small islet situated one mile south of Pond island.

Pond island ledge, with 3 feet water over it, extends $1\frac{1}{2}$ cables from the north extreme of that island, and is marked by a black spar buoy placed in $2\frac{1}{4}$ fathoms.

Trafton island ledge, awash at half tide, lies off the north-east extreme of that island, eastward of the anchorage, and has erected upon it a red beacon.

Directions.—From the eastward.—Pass half a mile southward of Nash island, and steer for Pond island lighthouse, until it is distant half a mile, and the town of Millbridge opens west of Trafton island, thence N.W. by N. past Trafton island, gradually altering the course to the northward, to pass a quarter of a mile westward of that island. When abreast the north extreme of Trafton island, haul to the eastward, and anchor under its north shore in 3 to 5 fathoms.

Ice forms a more or less formidable obstacle, to the navigation of Narraguagus bay between December and March. In severe winters it is dangerous to navigate between December and April, and wholly closed from the middle of January to 1st of March.

PETIT MANAN ISLAND, is situated nearly midway between the entrance of Narraguagus and Gouldsborough bays, and S.W. by S. distant $5\frac{1}{2}$ miles from Pond island. The island is connected to the mainland by Petit Manan bar, portions of which dry at low water, and is moreover surrounded by dangerous ledges, at distances varying from one to 5 miles from the lighthouse.

LIGHT.—Petit Manan lighthouse is built of gray granite, 109 feet high from base to focal plane, and exhibits at an elevation of 125 feet above high water, a *fixed* white light, varied by a *white flash* every *two minutes*, visible 17 miles.

Fog signal.—In foggy weather, a steam fog whistle is sounded, giving blasts of *five seconds* duration, at alternate intervals of *eight*, and *forty-two seconds*.

DANGERS surrounding Petit Manan island. — **South-east rock**, with 7 feet water on it, lies S. by E. distant 4 miles from Petit Manan lighthouse and is marked by a red and black horizontally striped can buoy, placed on its north side in 8 fathoms.

Jackson ledge, with 9 feet on it at low-water springs, is situated E. $\frac{1}{4}$ N. distant 4 miles from Petit Manan lighthouse, and is marked by a red and black nun buoy, placed on its north side.

The remaining shoals, with their bearings and distances from Petit Manan lighthouse, are as follows:—

Simms rock with 6 feet water on it, S. $\frac{1}{2}$ E. 2 miles, and marked by a red and black horizontally striped spar buoy placed on its north-east side, in 8 fathoms. Tibbett rock, with 4 feet over it, E. $\frac{1}{4}$ N., $3\frac{1}{2}$ miles. Dave Leighton ground, with 3 fathoms water on it, N.E. by E. $\frac{1}{8}$ E., $2\frac{1}{2}$ miles. Moulton ledge, dry at low water, W. $\frac{1}{4}$ N., 3 miles. At half a mile south from this ledge, the depth is only 3 fathoms; a spar buoy, painted red and black in horizontal stripes, is placed in 5 fathoms, half a cable southward of the ledge.

Petit Manan reef extends southward half a mile from Petit Manan island, and is marked by a black can buoy, placed in $7\frac{1}{2}$ fathoms. There are good passages between the above-mentioned ledges frequented by coasting vessels, but it is advisable for strangers to pass south of all these dangers.

DYER BAY, separated from Pidgeon bay on the east by Petit Manan point, and by Dyer point from Gouldsborough bay on the west, affords a good anchorage in Dyer harbour, situated on the western shore, $3\frac{1}{2}$ miles northward from Dyer point. The bay is easy of access, although there are several islets and reefs at the entrance. There is, however, a deep and safe channel close to Dyer bay ledges which may be used by strangers.

DANGERS. Dyer bay ledges, or Eastern island ledges, are above high water, and extend westward one mile from Eastern island, the most easterly of Sally islands forming an apparent barrier in the entrance to Gouldsborough bay. The south side of these ledges is foul, but the eastern side is steep-to.

Old Bull, dry at low water, and on which the sea always breaks, lies one-third of a mile from Petit Manan point, and well eastward of the fairway course into Dyer bay.

Yellow Birch reef, with 5 feet water on its western extreme, extends $2\frac{1}{2}$ cables from Yellow Birch head situated on the eastern shore, and $1\frac{1}{2}$ miles northward from Petit Manan point.

Northward of this reef there are no dangers, but the western shore should not be approached too closely.

Directions for entering Dyer bay.—Steer for the east extreme of Dyer bay ledges, taking care to avoid Moulton ledge; pass close eastward of Dyer bay ledges, and steer N. $\frac{1}{2}$ E. until abreast Stanley point, a round, white, bare head, situated on the western shore, and two-thirds of a mile northward of Dyer point, then N. by E. $\frac{1}{2}$ E. until northward of Sheep islands, where a berth may be taken up as convenient in 3 to 5 fathoms, mud and clay.

GOLDSBOROUGH BAY is separated from Dyer bay by a peninsula named Dyer Neck, which terminates in a low, rocky point (Dyer point) with several dangerous rocks extending from it. Goldsborough bay extends in a northerly direction 7 miles, with an average width of $1\frac{1}{4}$ miles, to the Narrows at 5 miles within the entrance; the channel leading into this bay lies between Eastern island and a group named Sally islands about a quarter of a mile west of it; there is a depth of 4 fathoms in this channel at low water.

Anchorage.—The principal anchorage in Goldsborough bay is in 3 to 4 fathoms, stiff clay and mud, on the western side near Garden point.

PROSPECT HARBOUR.—At 2 miles W. by S. from Eastern island lies Cranberry point, the eastern entrance point to Prospect harbour. From this low, rocky point, a ledge on which the sea invariably breaks (unless in very moderate weather), extends some distance to the southward. Petty point, the western entrance point, situated $1\frac{3}{4}$ miles W.N.W. from Cranberry point, is low, rocky, and covered with scrub, but the land behind rises to a considerable height. Prospect harbour is about $1\frac{1}{2}$ miles long in a north and south direction, and affords good anchorage in north or north-easterly gales.

LIGHT.—The lighthouse stands on Prospect harbour point, and exhibits at an elevation of 45 feet above the level of the sea, a flashing red and white light every *thirty seconds*, visible in clear weather from a distance of 11 miles.

Anchorage.—The best anchorage in Prospect harbour is in 3 to 5 fathoms with the lighthouse bearing E. $\frac{1}{2}$ N. distant about 3 cables.

DANGERS.—Little Black ledge, nearly covered at high water, lies one mile S. $\frac{1}{2}$ W. from Cranberry point, and $2\frac{1}{2}$ miles S. by $\frac{3}{4}$ E. from the lighthouse on Prospect harbour point; vessels from the eastward usually pass between Cranberry point and Little Black ledge.

Big Black ledge, or Big ledge lies W. by N. $\frac{1}{2}$ N. about one-third of a mile from Little Black ledge; at one third of a mile westward

on Clarke point bearing N.W. by W. $\frac{1}{2}$ W.; small vessels may anchor further to the westward in 4 fathoms, soft mud.

Tides.—It is high water, full and change, in south-west harbour a 11h. 2m.; springs rise 10 feet, neaps 9 feet.

Directions.—Approaching South-west harbour from the eastward by Mount Desert Eastern passage, north of Bunker ledge, keep tolerably near the Mount Desert island shore, and when Bunker ledge monument bears west distant about $1\frac{1}{2}$ miles, steer W. by N. for Bear island lighthouse, until Baker island lighthouse is seen open west of Bunker ledge monument bearing S. by E.; Lewis rock will then have been passed, when a West course will lead to the entrance of South-west harbour. Approaching the harbour south of Bunker ledge and Sutton island, Sperlin rock with 3 feet water is the only danger; it lies nearly in mid-channel between Sutton and Great Cranberry islands; a red spar buoy, No. 2 is moored in 3 fathoms just northward of this rock. Pass half a mile south of Bunker ledge monument, and when Baker island lighthouse is in line with the east end of Little Cranberry island bearing S. by E., steer W. $\frac{1}{2}$ N. until Long point, the north-eastern point of Great Cranberry island bears S. $\frac{1}{2}$ E., when a N.W. by W. $\frac{1}{2}$ W. course will lead to the entrance of South-west harbour.

GREAT CRANBERRY ISLAND the westernmost and largest of the group of six islands at the entrance of Some sound, is $1\frac{3}{4}$ miles long north and south, and thickly wooded, some parts are however cultivated, especially on the eastern side, where there is a long irregularly shaped cove, with 2 to 4 feet water, named The Pool. The eastern extremity of this island lies within a quarter of a mile of Little Cranberry island, having between a bar with only 4 feet water.

South Bunker ledge, situated three-quarters of a mile W. by S. $\frac{3}{4}$ S. from Race point, the south-western extremity of Great Cranberry island, dries at half tide, with deep water close around, on the top of this ledge stands a red spindle surmounted by a cage.

Long ledge, dry at low water, extends from Mount Desert island shore in a south-easterly direction more than half a mile. A black can buoy is moored in 3 fathoms water, near the eastern extremity of Long ledge and nearly three-quarters of a mile west of South Bunker ledge spindle.

BASS HARBOUR.—From Sea Wall point abreast Great Cranberry island, the southern shore of Mount Desert island trends in a general W.S.W. direction $2\frac{1}{2}$ miles to Bass harbour head, the eastern entrance point to Bass harbour which is about $1\frac{3}{4}$ miles long, and affords good

anchorage in 2 to 7 fathoms. The western entrance point is named Bass harbour point, and lies little over a mile from Bass harbour head.

About half a mile within the entrance points, the harbour contracts to 2 cables, forming the narrows joining the Outer and Inner harbours; there is a depth of $3\frac{1}{2}$ fathoms in the narrows, but northward of this the harbour shoals rapidly.

LIGHT.—On Bass harbour head stands a white lighthouse 26 feet high, from which at an elevation of 56 feet above the level of the sea, is exhibited a *fixed red* light, visible in clear weather from a distance of 13 miles.

Tides.—It is high water, full and change, in Bass harbour at 11h. 2m.; springs rise 10 feet.

Gott island, situated in the entrance to Blue Hill bay, at nearly a mile southward of Bass harbour head, is three quarters of a mile long, north and south, partly cultivated, but in most places thickly wooded. A bar with only 12 feet at low water extends across from this island to Bass harbour head. Close to Gott island on its south-western side lies Little Gott island, at $1\frac{1}{2}$ miles west of which lies Placentia island; southward of these islands at a short distance lies Black island, high and densely wooded.

The passage for large vessels bound into Bass harbour from the eastward is between Placentia island; and Burnt-Coat island about $1\frac{1}{2}$ miles westward of it, the passages between the other islands at the entrance of Blue hill bay are not recommended to strangers.

Drums ledge dries at three quarters ebb, is about a quarter of a mile in extent and lies directly in the track of vessels from the eastward bound through the passage between Placentia and Burntcoat islands. A black spar buoy, marked No. 5 is moored in 5 fathoms, about 50 yards southward of Drums ledge, with the south-eastern end of Long island bearing S.W. $\frac{1}{2}$ S. about 2 miles; middle of Black island N.N.W. 2 miles, and Staples point (south-eastern end of Burnt-Coat island) N.W. by W. $\frac{1}{2}$ W. $3\frac{1}{4}$ miles.

Horse-shoe ledge with 6 feet water and over a quarter of a mile long N.N.E. and S.S.W. lies N. by E. $\frac{1}{2}$ E. about one mile from Drums ledge, with depths of 14 to 19 fathoms between; there are about the same depths between Horse-shoe ledge and Black island.

Staples ledge dries at low water and lies 250 yards S.E. from Staples point. A black spar buoy is moored in 3 fathoms on its eastern side.

Directions.—Approaching Bass harbour from the eastward by the passage between Placentia and Burnt-Coat islands, after passing Great

Duck island which lies about $4\frac{1}{2}$ miles southward of Great Cranberry island, the entrance to Blue Hill bay will be open, and when the south-eastern point of Burnt-Coat island bears N.W. $\frac{1}{2}$ W. steer for it on that bearing, passing half a mile westward of Drums ledge, westward of Black and Placentia islands and eastward of Burnt-Coat island, after passing Placentia island, Bass harbour lighthouse will be seen and when bearing N.E. by E. $\frac{1}{2}$ E. should be steered for, until within a quarter of a mile of the lighthouse, thence N. by W. into the harbour, and anchor in $6\frac{1}{2}$ fathoms, with Bass Harbour point bearing S. by W. $\frac{3}{4}$ S., and the lighthouse S.E. by S. $\frac{3}{4}$ S.

Or, when about $1\frac{1}{4}$ miles south of Baker island lighthouse in 15 fathoms water, steer S.W. by W. $\frac{1}{2}$ W. for the middle of Long island, passing northward of the Duck islands (in not less than 9 fathoms water), a quarter of a mile southward of Drums ledge buoy, and when the centre of Black island bears N. by W., steer N.W. $\frac{1}{2}$ W. towards the south-eastern point of Burnt-Coat island, thence proceed as before directed.

BURNT-COAT HARBOUR situate on the south-western side of Burnt-Coat or Swan island, between Stanley point on the east, and Hockomock or Hokomoaka head on the west, is one of the best harbours of refuge on the coast of Maine, its widest part near the entrance is half a mile across, gradually narrowing towards the head about $1\frac{1}{2}$ miles above Harbour island which lies in the middle of the entrance.

LIGHTS.—On Hockomock point stand two white lighthouses 100 feet apart, and bearing from each other N. E. $\frac{1}{4}$ N. and S.W. $\frac{1}{4}$ S.; from the northern lighthouse is exhibited at an elevation of 75 feet above the level of the sea, a *fixed* white light, visible in clear weather from a distance of 16 miles; and from the southern lighthouse, at an elevation of 42 feet, a *fixed* white light, visible in clear weather from a distance of 11 miles.

Directions.—Entering Burnt-Coat harbour, steer towards the entrance, with the lights in line bearing N.E. $\frac{1}{4}$ N. until within a distance of $1\frac{1}{2}$ cables, thence N.E. by E. until the lights bear westward of N.W. by N., when a N. $\frac{1}{2}$ E. course should be steered, passing westward of Harbour island, and anchor as convenient.

LIGHT.—**Mount Desert rock**, 15 feet high, lies 16 miles S. $\frac{1}{4}$ W. from Baker island, and 13 miles from the nearest land (east extreme of Long island). The lighthouse on Mount Desert rock is 60 feet high, exhibiting at an elevation of 75 feet above high water a *fixed* white light visible in clear weather from a distance of 14 miles.

Fog Signal.—In foggy weather a bell is sounded in answer to passing vessels.

COLUMBIA LEDGE, lies nearly one mile S.S.W. from Mount Desert rock and has 4 fathoms on it, with 17 to 35 fathoms between it and the rock ; 2 miles south of the ledge is a bank about 10 miles in extent with depths of 20 to 50 fathoms on it, between the ledge and the bank the depths are from 80 to 95 fathoms.

Isle au Haut 400 feet high, situated 12 miles west of Burnt-Coat island, is nearly 6 miles long N.N.E. and S.S.W. with an average width of about 2 miles. It is easily recognised, being the highest land in the vicinity, and thickly wooded.*

PENOBCOT BAY the largest and most important bay on the coast of Maine, is about 28 miles long in a general N.N.E. direction, and 20 miles wide at its entrance, which lies between Isle au Haut on the east, and White head (at the entrance to Muscle Ridge channel), on the west. The bay is divided into two parts, known as East or Isle au Haut bay, and West Penobscot bay, by several large and small islands lying about midway between the eastern and western shores.

PENOBCOT RIVER, the largest in the State of Maine, is formed by two branches, the east and west, which unite in Penobscot county, near the centre of the state, whence the river takes a general trend to the S.S.W. for a distance of 130 miles to the entrance, discharging itself at the head of Penobscot bay.

The river has a depth of 10 fathoms at its entrance, and is tidal, and navigable as far as Bangor, a city on the right bank, 30 miles from the entrance, where the tide rises 20 feet.

Commerce.—The city of Bangor is one of the largest lumber depôts in the world : 2,000 vessels are annually employed in this trade during the season of navigation, which usually continues eight or nine months in the year. Bangor has also an extensive foreign and coast trade, and several shipbuilding establishments.

Population.—The population of Bangor consisted in 1879 of about 16,000.

LIGHT.—On Saddle-Back ledge, near the south-west end of Isle au Haut, stands a lighthouse 36 feet high, exhibiting at an elevation of 51 feet above high water, a *fixed* white light, visible in clear weather from a distance of 12 miles.

CAUTION.—Between Saddle-back ledge and Carver harbour are several dangerous ledges extending nearly the whole distance across.

Fox islands which separate East from West Penobscot bays, consist of two large and several small islands. The southernmost island, named Vinal Haven island, is 5 miles long N.E. and S.W., and very

* See Admiralty chart :—Little Spoon island to Pemaquid point, No. 612 ; scale, $m = 0.9$ of an inch.

irregular in shape, this island is separated from North Haven island by a passage known as Fox islands thoroughfare. The southern point of Vinal Haven island lies $3\frac{1}{2}$ miles N.W. by W. from Saddle-back ledge lighthouse, with several islets extending between 2 and 3 miles to the southward, this part should not be approached without a pilot.

LIGHT.—On Green or Heron Neck island, at the southwest extremity of the Fox islands, stands a white lighthouse 24 feet high, from which at an elevation of 92 feet above the level of the sea, is exhibited a *fixed* white light, visible in clear weather from a distance of 14 miles.

Fog signal.—During foggy weather a bell is sounded.

LIGHT.—Owl's head forms the southern point of entrance to Rockland harbour, the first harbour on the western shore of Penobscot bay, northward of the Muscle Ridge channel; the lighthouse 19 feet high, stands on the summit of the head and exhibits at an elevation of 105 feet above the level of the sea, a *fixed* white light, visible in clear weather from a distance of 16 miles.

Fog signal.—During foggy weather, a bell is sounded *four times a minute*.

LIGHT.—White Head island.—On the west end of White Head island stands a lighthouse 34 feet high, from which at an elevation of 79 feet above the level of the sea, is exhibited a *fixed* white light, visible in clear weather from a distance of 14 miles.

Fog signal.—During foggy weather, a steam whistle is sounded for *four seconds* at intervals of *twenty-six seconds*. In case of accident to the whistle a bell will be sounded.

LIGHT.—Tennant harbour situated 4 miles west from White Head island, is $1\frac{1}{4}$ miles long in an east and west direction, with an average width of $2\frac{1}{2}$ cables. On Southern island the south entrance point of Tennant harbour, stands a lighthouse 26 feet high, from which is exhibited at an elevation of 69 feet above the level of the sea, a *fixed red* light, varied by a *red flash once every minute*; visible in clear weather from a distance of 13 miles.

Tides.—It is high water, full and change, in Tennant harbour at 10h. 45m.; springs rise 10 feet, neaps 9 feet.

MATINICUS ISLAND.—Off the west entrance to Penobscot bay there are several islands and rocks, the largest of which, Matinicus island, 40 feet high, is about $1\frac{1}{4}$ miles long N.N.E. and S.S.W. and about three-quarters of a mile broad.

LIGHTS.—Matinicus rock 15 feet high, lies 13 miles southward of the entrance to Penobscot bay and S. $\frac{1}{4}$ E. 4 miles from Matinicus island. On this rock stand two lighthouses 60 yards apart N.N.W. and S.S.E.

from each other, exhibiting two *fixed* white lights, elevated respectively 90 and 85 feet above the level of the sea, visible in clear weather from a distance of 14 miles. The towers are of granite 50 and 40 feet high.

Fog signal.—In foggy weather, a steam whistle will sound for *five seconds* at intervals of *twenty-five* seconds. In case of accident to the whistle a bell will be sounded.

LIGHT.—**Marshall point**, the eastern entrance point to St. George river, lies nearly 7 miles westward of White head, the point is high and bare, but extends off into a low rocky ledge from 6 to 10 feet above high water, on which stands a lighthouse 24 feet high, connected with the keeper's dwelling by a covered way painted brown, the light *fixed* white, is exhibited from an elevation of 31 feet above the level of the sea, and should be seen in clear weather from a distance of 10 miles.

Fog signal.—During foggy weather a bell is sounded.

ST. GEORGE RIVER.—The entrance to St. George river lies between Marshall point, and Gay island at $2\frac{3}{4}$ miles to the westward, it is obstructed by numerous islands and ledges, through which are three principal channels; the easternmost named Herring Gut lies between Marshall point and Hooper island, the middle between Hooper and George islands, and the westernmost between Caldwell island (the northernmost of George islands) and Gay island. There is sufficient water in these channels for large vessels, local knowledge however is necessary.

MONHEGAN ISLAND.—The westernmost of the outlying islands off Penobscot bay is situated W. by N. 21 miles from Matinicus rock. It lies N.E. and S.W., is $1\frac{1}{2}$ miles long, high and steep to; Green point the north-east extreme of the island is high and wooded, a short distance south of this point, on the eastern shore, there is a bluff, precipitous head, named Black head, thence the land slopes gradually to Lobster point, the south-west extreme, which is low and thickly wooded.

LIGHT.—Near the middle of Monhegan island, on a summit 140 feet high, stands a gray stone tower 36 feet high which exhibits at an elevation of 175 feet above the level of the sea, a *flashing* white light *every minute*, visible in clear weather from a distance of 19 miles. When within 3 miles of the island the light is obscured between the bearings of N.E. $\frac{1}{2}$ E. and E. $\frac{1}{4}$ N. (from the lighthouse) by high land.

Fog signal.—During foggy weather, a powerful trumpet on Manana island, at about one cable from the western shore of Monhegan island, gives blasts of *fifteen seconds* at intervals of *forty seconds*. A bell will be sounded in case the trumpet is disabled.

MUSCONGUS BAY, situated about 15 miles westward of White Head island is $8\frac{1}{4}$ miles wide at its entrance which lies between George islands on the east and Pemaquid point on the west. Two important rivers empty themselves into this bay, St. George on the eastern side and Medomak at its head.

Ice.—Ordinarily the St. George and Medomak rivers are closed to navigation during the month of February and part of March.

George islands consist of several large and small islands, extending in a N.N.E. and S.S.W. direction, for a distance of 5 miles. Allen island the southernmost and largest of the group is $1\frac{1}{2}$ miles long N.E. by N. and S.W. by S.; Burnt island the next in size lies half a mile eastward of Allen island.

LIGHT.—On Franklin Island at $2\frac{1}{4}$ miles north-west from Allen island, stands a white lighthouse 35 feet high, from which at an elevation of 54 feet above the level of the sea, is exhibited a *fixed* white light, varied by a white *flash* at intervals of *one and a half minutes*, visible in clear weather from a distance of 12 miles.

Muscongus sound, which forms a good roadstead for vessels, lies between Muscongus and Hog islands on the east, and Pemaquid neck on the west, it is $4\frac{1}{4}$ miles long N.E. by N. and S.W. by S. and three-quarters of a mile wide between the south extreme of Muscongus island, and Brown head, the west entrance point at 5 miles north-east of Pemaquid point; the western shore of the sound is 140 feet high and thickly wooded to its summit.

LIGHT.—On the eastern side of Pemaquid point, nearly half a mile from its south-west extremity, stands Pemaquid lighthouse, which is a guide to John bay, Muscongus bay, and the approaches to St. George river, the lighthouse is white, 32 feet high, and exhibits from an elevation of 75 feet above the sea, a *fixed* white light, visible in clear weather from a distance of 14 miles.

JOHN BAY,* is the next bay westward of Muscongus bay, the entrance lies between Pemaquid point and Thrumbeap island, at $1\frac{1}{2}$ miles west of it, thence the bay extends in a northerly direction with nearly the same width for $2\frac{3}{4}$ miles to its head, where there are two branches, the northern named John river and the north-eastern Pemaquid river. The shores of John bay are steep to as far as John island at $2\frac{1}{4}$ miles within the entrance, on the north-east side of this island there is good anchorage in 6 and 7 fathoms water, in the entrance to Pemaquid river, this anchorage is known as Pemaquid harbour.

* See Admiralty chart:—Pemaquid point to Fletchers Neck, No. 2,490; scale $m = 0^{\circ} 9$ inches.

Pemaquid ledge, with 14 feet water, lies S.W. $\frac{1}{4}$ S. $1\frac{1}{4}$ miles nearly from Pemaquid lighthouse. A spar buoy painted with red and black horizontal stripes is moored in 6 fathoms, just to the south-eastward of this ledge.

Thrumbeacp ledge, with $3\frac{1}{2}$ fathoms water, and on which in heavy southerly winds, the sea sometimes breaks, lies a quarter of a mile E. by S. from the northern end of Thrumbeacp island, having in the channel between 18 to 21 fathoms water.

KENNEBEC RIVER is the next important in the State of Maine to Penobscot river, having its principal source in Moosehead lake, Somerset county, and after following a general southerly course for about 150 miles, falls into the Atlantic ocean about 11 miles W. by S. from the entrance to John bay. The principal towns on the bank of Kennebec river are Bath, Hallowell, Augusta, Waterville, and Norridgewock.

The river is navigable for large ships as far as Bath a distance of 12 miles from the entrance, and for small vessels of 150 tons as far as Augusta, a distance of nearly 40 miles from the entrance.

LIGHT.—Pond island.—The lighthouse on Pond island, at the west side of entrance to Kennebec river, is white, 18 feet high, exhibiting at an elevation of 54 feet above high water a *fixed* white light, visible in clear weather from a distance of 13 miles.

Fog signal.—During foggy weather, a bell is sounded *eight times* every *minute*.

LIGHT.—Seguin island.—Off the entrance of Kennebec river, and nearly 2 miles south of Pond island is Seguin island with numerous rocks and shoals in its vicinity. The lighthouse is a gray tower, 35 feet high, exhibiting at an elevation of 180 feet above the sea a *fixed* white light, which in clear weather should be visible from a distance of 20 miles.

Fog signal.—During foggy weather, a whistle is sounded for *eight seconds* at intervals of *fifty-two seconds*.

Tides.—It is high water, full and change, at Hunniwell point, at 11h. 15m.; springs rise 8 feet, neaps 6 feet; and at Bath at 12h. 13m.; springs rise 6 feet, neaps 5 feet.

Stage island bay, situated between Salter and Stage islands on the north side of Kennebec river entrance, affords good anchorage in 2 to 5 fathoms, soft bottom, and is useful for vessel waiting to enter the river.

DANGERS.—Bantam rock, dry at low water, lies S.S.W. $\frac{3}{4}$ W. $1\frac{1}{2}$ miles from Damiscove island the southernmost of a group of islands situated about midway between Pemaquid point and Kennebec river. A red

nun buoy (No. 2) is moored about half a cable S.W. from Bantam rock.

Toms rock, with 9 feet water, lies W. by N. $\frac{1}{4}$ N. 4 miles from Bantam rock. A red spar buoy marked No. 2 is moored in deep water on the south-west side of this rock.

White ledge, with 8 feet water, lies W. $\frac{1}{2}$ N. $1\frac{1}{2}$ miles from Toms rock, and N.E. by N. one mile from the north extreme of Seguin island. A black spar buoy (No. 1) with the letters W.L. painted in white, is moored about a quarter of a cable eastward of White ledge.

Mile ledge, with 18 feet water lies one mile S. $\frac{1}{2}$ W. from Seguin island lighthouse. A can buoy painted in red and black horizontal stripes is moored in 7 fathoms, water, about 100 yards south of this ledge.

Directions.—Vessels bound into the river eastward of Seguin island should steer for Pond island lighthouse bearing N.W. by W. until the south point of Salter island bears N.N.E. $\frac{1}{4}$ E., then steer N.W. $\frac{1}{2}$ N.; when the south point of South Sugar-loaf island bears East, run up N. by W. $\frac{1}{2}$ W. in mid-channel for Hunniwell point, (on which there is a fort,) closing in on Long island shore to avoid the shore of Hunniwell point. Anchor in 5 to 8 fathoms in the cove, northward of the point. Bound into the river westward of Seguin island, with Seguin island lighthouse bearing E.N.E., distant three-quarters of a mile, steer N.N.E. $\frac{1}{4}$ E. for the south point of Salter island until Pond island lighthouse bears N.W. by W., when run in as before. The tides in the Kennebec are very strong, and no sailing vessel should enter without a sufficiently strong fair wind to stem the tide.

Anchorage.—There is good anchorage in moderate weather between Seguin island and Pond island, within half a mile of the latter, in 4 to 8 fathoms; also, with an off-shore wind, between small point and Seguin island, taking care to avoid Jack-knife ledge.

PORTLAND,* the capital of Maine, lies near the south-western end of the State, and about 160 miles from the western frontier of New Brunswick. It is a large and populous town with an extensive foreign and coasting trade, and stands on a peninsula about 2 miles long, by an average breadth of three-quarters of a mile, the ground gradually rising from the sea and culminating in Munjoy hill elevated 135 feet above high water. The observatory and signal station (a conspicuous red tower) stand on this hill.

* See Admiralty plan:—Portland harbour, No. 2,488, scale, m=3·6 inches.

Portland is separated from the north part of cape Elizabeth, by the mouth of Fore river, which forms Inner harbour.

LIGHTS.—**Cape Elizabeth.**—At cape Elizabeth, 4 miles southward of Bang island, near the entrance to Portland harbour, are two lighthouses, 308 yards apart, 53 feet high from the base to centre of lantern, bearing S.W. by W. and N.E. by E. from each other and each exhibits, at the height of 138 feet above high water, a *fixed* white light; the south-western light being varied by a white flash *every minute*. Both should be seen in clear weather from a distance of 17 miles, excepting between the bearing of N.E. by E. $\frac{1}{2}$ E. and the shore of Saw bay, when the western light only is visible. Both towers are painted white.

Fog signal.—A siren is sounded, giving *two* blasts of *five seconds* each, with an interval between them of *eight seconds*, followed by a pause of *forty-two seconds*, in each minute during foggy weather or snow-storms.

Halfway rock.—On Half-way rock, in Casco bay, is exhibited, at 75 feet above high water, a *fixed* white light showing a *red flash every minute and a half*, and should be seen 14 miles. The light-house is gray and 66 feet high. An automatic whistling buoy is placed in 19 fathoms S.E. $\frac{1}{4}$ S. eight cables from Half-way rock lighthouse.

Portland head.—On Portland head, southward of the entrance to Portland harbour, is a white tower, 69 feet high, which exhibits, at the height of 96 feet above high water, a *fixed* white light, visible 15 miles.

Fog signal.—A trumpet is sounded giving a blast of *eight seconds* duration, at intervals of *forty seconds* during foggy weather.

Portland breakwater.—On the north-east end of Portland breakwater is a white tower, which exhibits, at the height of 18 feet above high water, a *fixed red* light, varied by a *red flash every forty seconds*; visible 8 miles.

Wood island.—On Wood island, near the entrance to Saco river, and half a mile northward of the east extreme of Fletchers Neck, is a white tower 47 feet high, which exhibits, at the height of 57 feet above high water, a *fixed red* light varied by a *red flash every minute*, and visible from a distance of 13 miles; except between the bearings of S.E. by E. and E. $\frac{1}{2}$ S.

Fog Signal.—In foggy weather a bell is sounded, giving *two strokes* in quick succession *every twenty-five seconds*, alternately with a *single stroke*.

DANGERS OUTSIDE PORTLAND HEAD.—From abreast cape Elizabeth for a distance of nearly 7 miles eastward there are several rocky ledges, some of which are dangerous, and lie immediately in the track of vessels bound into Portland harbour.

Johnson rock, with 7 feet water, and 6 to 8 fathoms close around, lies N.E. $\frac{3}{4}$ E. a quarter of a mile from Outer Green island, and W. by N. $3\frac{1}{2}$ miles from Half-way rock lighthouse.

East Hue and Cry rocks, two shoal patches, with 18 feet water on them, lie $1\frac{1}{4}$ miles S. $\frac{1}{4}$ E. from Alden rock, with cape Elizabeth east lighthouse bearing N.W. $\frac{3}{4}$ N., distant 3 miles; and Portland lighthouse N. by W. $\frac{1}{2}$ W. 6 miles. They are marked with a black can buoy.

West Hue and Cry rock, with $4\frac{1}{2}$ fathoms, lies W. $\frac{1}{4}$ S. 7 cables distant from East Hue and Cry rocks. A patch of $4\frac{1}{2}$ fathoms lies S. $\frac{1}{4}$ W. 7 cables from the same.

Old Anthony rock, with 3 fathoms water on it, lies nearly midway between the Hue and Cry rocks, and cape Elizabeth. From the west lighthouse on the latter, the rock bears S. by E. $\frac{3}{4}$ E. $1\frac{1}{2}$ miles, and from Alden rock W. by S. $\frac{3}{4}$ S. $1\frac{1}{2}$ miles. It is marked by a can buoy with red and black horizontal stripes. An automatic whistling buoy is placed half a mile southward of Old Anthony rock.

Taylor reef, consists of three rocky patches, with 15 feet least water, lying E.N.E. and W.S.W. of each other. The east and west extremes bear S.E. by E., and S.S.E., respectively, three-quarters of a mile distant from the west lighthouse on cape Elizabeth. The eastern side of Taylor reef is marked by a black can buoy, placed in 8 fathoms.

Watts ledge, extends 4 cables from the east side of Richmond island, the western part being awash at high-water springs. The east extreme has 14 feet water on it, and will be cleared by keeping the east lighthouse on cape Elizabeth northward of N.E. $\frac{3}{4}$ N.

Mitchell rock, with $5\frac{1}{4}$ fathoms water on it, lies nearly East $1\frac{4}{10}$ miles from cape Elizabeth east lighthouse.

Alden Rock.*—This dangerous rock with only 6 feet water on it lies with cape Elizabeth east lighthouse, bearing N.W. by W., distant 2 miles; Portland lighthouse, N. by W. $\frac{1}{2}$ W., $4\frac{3}{4}$ miles; Wood island lighthouse, S.W. by W. $\frac{3}{4}$ W., $9\frac{1}{2}$ miles. A black nun buoy is placed to the southward of it in 5 fathoms. Shoal water extends E. by N. $\frac{1}{2}$ N. half a mile from Alden rock, terminating in a patch of $3\frac{1}{2}$ fathoms, named Corwin rock; it is marked by a nun buoy painted red and black with horizontal stripes, placed on the south-east side of it.

* Lieut. Woodhull, U.S. Navy, reports of this rock:—"It lies immediately in the way of all navigation, and particularly of vessels bound westward, or of those leaving the harbour of Richmond island. I considered this the great danger when approaching Portland harbour. It is the cause of much anxiety and care to the navigator, and one that is avoided with the greatest difficulty in thick weather, and during the prevalence of the terrible easterly storms by which the coast of Maine is so frequently visited."

West Cod ledge within the limits of 10 fathoms is 4 miles long in a N.E. by E. $\frac{1}{2}$ E. and S.W. by W. $\frac{1}{2}$ W. direction, and has on it three shoal spots. Bulwark shoal with 14 feet water over it is the shallowest of these and is situated near the east extreme. From it cape Elizabeth east lighthouse bears W. $\frac{2}{3}$ S. 6 miles, Portland head lighthouse N.W. by W. $\frac{3}{4}$ W. 6 miles, and Half-way rock lighthousse N.E. $\frac{1}{2}$ N. $3\frac{2}{3}$ miles. On the south-east side of Bulwark shoal is placed a nun buoy with red and black horizontal stripes. Bache rock of $4\frac{1}{4}$ fathoms, and West Cod ledge rock of $4\frac{1}{2}$ fathoms, are the other two shoals on the ledge, and lie W.S.W., 9 cables, and 3 miles, respectively from Bulwark shoal.

East Cod ledge separated from West Cod ledge by deep water consists of two patches N.E. $\frac{1}{2}$ E. and S.W. $\frac{1}{2}$ W. two-thirds of a mile from each other. The north-east patch with $4\frac{3}{4}$ fathoms is named Round shoal ; the south-west spot with 7 fathoms is known as East Cod ledge rock. They bear respectively E. by S. $1\frac{4}{10}$ miles and S.E. $\frac{1}{2}$ E. $1\frac{1}{10}$ miles from Bulwark shoal.

Half-way rock with South-west ledge dry at low water, extending W.S.W. 2 cables, and Webster rock with 11 feet water $1\frac{3}{4}$ cables, North from it, has ceased to be as dangerous as formerly by the erection of a lighthouse on it. Lumbo ledge with 11 feet water over it, lies E. $\frac{1}{2}$ N. $4\frac{3}{4}$ miles from Half-way rock.

Trundy reef, the shore half of which dries at low water, extends to the north-eastward from Trundy point three-quarters of a mile. As the lead drops from $2\frac{3}{4}$ fathoms at once into 5 and 6 fathoms water, and the flood stream sets strong over the reef, great care is necessary when near it. It is marked by a black nun buoy placed in 10 fathoms.

Broad Cove rock, with 7 feet water lies off Broad cove and half a mile from shore. A black can buoy is placed on the eastern extreme of the shoal water, at 4 cables N.E. from the rock.

Willard rock, with $5\frac{1}{4}$ fathoms on it, is situated N.E. by N. $2\frac{1}{4}$ miles from the east lighthouse on cape Elizabeth, and S.S.E. $\frac{1}{4}$ E. $1\frac{3}{4}$ miles from Portland lighthouse.

Jordan reef, with 22 feet water on it, lies one mile S.E. by E. $\frac{1}{4}$ E. from Portland lighthouse ; it is marked with a red and black horizontally striped nun buoy.

Pine tree ledge.—A small patch with 21 feet, and Witch rock with 24 feet water over them lie respectively S.E. $\frac{3}{4}$ S. $4\frac{1}{2}$ cables, and N.E. by E. $\frac{1}{2}$ E. $6\frac{1}{2}$ cables, from Jordan reef. Ram island ledge extends 3 cables

S. by W. from the south point of Ram island, its southern extreme being marked by a red tripod beacon, 50 feet high.

DANGERS INSIDE PORTLAND HEAD.—Catfish rock, with 16 feet water lies W.N.W. three-quarters of a cable from the south-west extreme of Bang island; a red spar buoy being placed in 4 fathoms a short distance south of the rock.

Bang island ledge extends $1\frac{1}{2}$ cables off the north-west extreme of Bang island and is marked by a red spar buoy moored in 4 fathoms.

Spring point ledge extends N.E. by N. $1\frac{1}{2}$ cables from Spring point, and is marked by a black can buoy in 5 fathoms, bearing from Portland head lighthouse N. $\frac{1}{4}$ W. distant nearly 2 miles.

The entrance to Portland Inner harbour is obstructed by a mud bank, the shallowest part of which is named Middle Ground with 9 feet water over it, and marked at its east and west extremes by a red spar buoy.

The southern portion of the mud bank is known as Staniford ledge; a black nun buoy is placed in 10 feet water N. by E. one cable from Breakwater lighthouse.

Directions.—Channel between West Cod ledge rock and Corwin rock.—If from the eastward, bring cape Elizabeth lighthouses to bear W. by N. $\frac{1}{2}$ N., and steer for them until Portland head lighthouse bears N.N.W. $\frac{1}{2}$ W., when the vessel will be about three-quarters of a mile S.W. by S. from West Cod ledge rock ($4\frac{1}{2}$ fathoms), and the same distance E. by N. from Corwin rock ($3\frac{1}{2}$ fathoms). Steer for Portland head lighthouse bearing N.N.W. $\frac{1}{2}$ W. for about $2\frac{1}{4}$ miles, until cape Elizabeth lighthouses are in line bearing S.W. by W.; thence N. by E. nearly half a mile, until Portland head lighthouse bears N.W. $\frac{3}{4}$ N. Steer for it on this bearing until within one-third of a mile of the lighthouse; whence steer N. by W. towards the south-west end of House island until fort Preble, or Spring point, bears S.W. by W. $\frac{3}{4}$ W. Steer N.W. $\frac{1}{2}$ N. until Breakwater lighthouse bears S.S.W., and the red buoy on the east extreme of Middle ground bears N.W. $\frac{1}{2}$ N. distant $1\frac{1}{2}$ cables, when a W. $\frac{1}{4}$ S. course leads in mid-channel to the anchorage off the wharves, carrying 19 feet into Inner harbour at low water. If of large draught, and wishing to anchor in Hog island roads; when fort Preble bears S.W. by W. $\frac{1}{4}$ W., a N.E. course leads to that anchorage. Taking care to avoid a bank of 2 to 3 fathoms water, extending a third of a mile from the north side of House island.

A channel into Inner harbour north of Middle ground with a depth of 19 feet at mean low water is artificially maintained.

These courses pass a quarter of a mile north-east of Willard rock ($5\frac{1}{4}$ fathoms); a quarter of a mile south-west of Pine tree ledge; and one-third of a mile south-west of Jordan reef ($3\frac{1}{2}$ fathoms). The continued course for Portland head lighthouse bearing N.N.W. $\frac{5}{8}$ W. leads close to Willard rock, and is safe with a smooth sea; but with a swell, the courses given above should be followed. If continuing N.N.W. $\frac{5}{8}$ W. for Portland head lighthouse; when within one-third of a mile from it, steer N. by W. as before directed.

If from the southward, and wishing to take the same channel keep 5 miles from cape Elizabeth lighthouses. This distance clears all dangers, with the lighthouses between the bearings of N.E. by E. and W. $\frac{1}{2}$ N. Bring Portland head lighthouse to bear N.N.W. $\frac{5}{8}$ W., and steer in as above.

Channel between West Cod ledge rock and Bache rock.—With cape Elizabeth lighthouses bearing W. by N. $\frac{1}{2}$ N., bring Portland head lighthouse to bear N.W. $\frac{1}{4}$ W. Run in on this last bearing passing nearly a mile north-east of West Cod ledge rock, and a mile south-westward of Bache rock ($4\frac{1}{4}$ fathoms); until cape Elizabeth lighthouses are in line bearing S.W. by W.; then steer N.W. by W. $\frac{1}{2}$ W. about $1\frac{1}{4}$ miles, until Portland head lighthouse bears N.W. $\frac{3}{4}$ N. Steer on this bearing, passing one-third of a mile north-east of Willard rock; a quarter, and one-third of a mile south-westward, respectively, of Pine tree ledge and Jordan reef until within one-third of a mile of the lighthouse, when follow the directions given above.

To pass northward of Cod ledges.—Run in with Portland head lighthouse bearing W. by N. $\frac{3}{4}$ N., passing half a mile, and two-thirds of a mile northward respectively of Round, and Bulwark shoals; and passing between, and a quarter of a mile from, Jordan reef and Witch rock.

Along the coast from the eastward.—When 2 miles south of Small point, if the weather be clear, Portland head lighthouse should be seen bearing W. $\frac{1}{4}$ N., distant $16\frac{1}{2}$ miles. This bearing leads nearly $1\frac{1}{4}$, and $1\frac{1}{2}$ miles, southward respectively of Temple ledge with 5 fathoms, and Lumbo ledge with 11 feet water. It also passes close to the whistling buoy three quarters of a mile south of Half-way rock, and the same distance south of Junk of Pork rock; and nearly midway between Ram island ledge, and Witch rock.

Along the coast from the westward.—When cape Elizabeth lights bear N.E. $\frac{3}{4}$ N. distant 5 miles, steer N.E. $\frac{1}{2}$ E. for Taylor reef buoy, passing three quarters of a mile west of the Whistling buoy south of Old Anthony rock. Having made Taylor reef buoy, pass east of it and steer N. $\frac{1}{2}$ E., to pass east of Broad cove rock and Trundy reef buoys,

after which a N. by W. course will lead to the entrance when proceed as before directed.

Cape Elizabeth lighthouses in line bearing S.W. by W. lead clear of all dangers between Mitchell and Willard rocks; to the eastward of Junk of Pork; and between Jewell island and Half-way rock, up to the entrance of Harpswell sound.

In thick weather strangers should not approach from the southward and eastward to a less depth than 45 fathoms, soft bottom.

HUSSEY SOUND (between Long and Peak islands), the southern entrance to which is 6 miles N.N.E. $\frac{1}{4}$ E. from cape Elizabeth, contains deep water, and is important as leading to a commodious, and well sheltered anchorage for large vessels, on the north side of Long island.

From seaward a N. by W. course for the middle of Cow island, will lead through the sound, in not less than $4\frac{3}{4}$ fathoms; passing nearly a mile west of Hussey rock with 2 fathoms water over it, marked by a red and black horizontally striped, can buoy, lying midway between Junk of Pork rock, and the southern entrance to the sound; also east of a shoal of 10 feet, extending 3 cables E.N.E. from the south-east extreme of Peak island.

After passing Pumpkin Knob, steer between Cow and Long islands, and anchor as convenient in 7 to 10 fathoms, taking care to avoid Cow island ledge, which dries at low water, and is marked by a black spar buoy, placed on the south-east side. This ledge lies nearly midway between Cow and Clapboard islands.

Here, a large number of vessels may be moored safe from all winds, and can put to sea with suitable wind and tide. The flood stream sets strong into, and the ebb out of the sound. Anchorage can be obtained between Pumpkin Knob, at the north end of Peak island, and Great Hog island in 6 to 10 fathoms water, good holding ground.

Ice seldom offers any serious difficulty in approaching, or anchoring in any of the harbours near Portland, except Inner harbour, which is usually closed during January and February.

Tides.—It is high water, full and change, at Portland at 11h. 17 m.; springs rise $9\frac{1}{2}$ feet, and neaps 9 feet. The depths given in the preceding directions for Portland harbour are above the level of mean low water. At extremely low tides, there will be found $2\frac{1}{2}$ feet less water.

In the channel between Bang island and cape Elizabeth shore, the flood and ebb streams run at Springs, with a velocity of three-quarters of a knot.

RICHMOND ISLAND HARBOUR.—At one mile south-west of cape Elizabeth lies Richmond island, on the north-west side of which there is safe anchorage, with the wind from North round east to S.E., in good holding ground of clay, covered 6 inches to a foot in thickness

with sand. The harbour is easy of access and useful when vessels cannot get into Portland, no pilot being required.

DANGERS.—Old Proprietor awash at half tide is situated W. $\frac{3}{4}$ N. nearly 2 miles from the west point of Richmond island. A black spar buoy is placed in 5 fathoms on the south-east side of the rock.

Chimney rock dry at low water, lies on the north side of the harbour, and bears from the west point of Richmond island N.N.W. $\frac{1}{2}$ W. 6 cables distant. A black spar buoy is placed on the south-east side of the rock.

A shoal of 16 feet lies E.S.E. a quarter of a mile from Chimney rock.

A bank extends a quarter of a mile from the breakwater which connects Richmond island and cape Elizabeth.

West ledge most of which dries at low water, extends one cable from the west point of Richmond island.

Directions.—The only directions necessary in entering Richmond Island harbour are, to approach it with cape Elizabeth west lighthouse in line with the north side of Richmond island E.N.E., and anchor in 4 to 7 fathoms, with the wharf on the island bearing East. Vessels of lighter draught may stand in until the wharf bears S.E. $\frac{1}{2}$ E.

Tides.—It is high water, full and change, at Richmond island at 11h. 30m.; springs rise 11 feet, neaps $9\frac{1}{4}$ feet.

A lifeboat is stationed at Fletchers Neck.

CAPE PORPOISE* is the name given to the eastern extreme of Cape island, the easternmost of a group of islands lying south-west 6 miles from Fletchers Neck. Goat island is situated W. by S. half a mile from cape Porpoise, forming the north entrance point to Porpoise harbour.

LIGHT.—Goat island.—A lighthouse painted white, is built on the south-west part of Goat island, and exhibits from an elevation of 33 feet above high water, a *fixed* white light visible seaward 11 miles.

CAPE NEDDICK, a projecting low headland, is situated S.W. 14 miles from cape Porpoise and N.E. 8 miles from the entrance to Portsmouth harbour. Temporary shelter may be obtained on either side of the cape according to the direction of the wind.

LIGHT.—The Knubble (Cape Neddick).—On York Knubble, a low islet almost connected at low water with cape Neddick, is erected a conical white lighthouse, which shows from an elevation of 87 feet above high water, a *fixed red* light, visible 15 miles, except between the bearings of S. by E. to E. by S. $\frac{1}{2}$ S.

Fog Signal.—In foggy weather, a bell is sounded, giving *two strokes* in quick succession, alternately with a *single stroke*, every *thirty seconds*.

* See Admiralty chart :—Fletcher's Neck to cape Cod, No. 2,482; scale, m = 0.26 inches.

BOON ISLAND, a small rock a few feet above high water lies S.E. $\frac{1}{2}$ E. $5\frac{1}{2}$ miles from York Knubble lighthouse.

LIGHT.—A lighthouse of gray colour is erected upon Boon island and exhibits a *fixed* white light from an elevation of 133 feet above high water, visible in clear weather 17 miles.

Boon island ledge awash at low-water springs lies E. $\frac{1}{2}$ S. $2\frac{1}{2}$ miles from Boon island lighthouse. Boon island ledge is marked by a red and black horizontally striped, automatic nun buoy placed in 10 fathoms on its south-east side. This buoy is surmounted by a whistle giving blasts at short intervals.

It is not prudent to pass between the ledge and lighthouse.

Pollock rock with 15 feet water over it at extreme low tides lies W.S.W. three-quarters of a mile from Boon island lighthouse.

PORTSMOUTH,* the only port in the State of New Hampshire, has an extensive sea-borne trade. The harbour has a depth of not less than 6 fathoms water to abreast the town, which lies about 4 miles from the entrance. On Navy island is situated the dockyard known as Kittery Navy-yard, of about 80 acres area, with a floating lift dock, 324 feet long over all, and 90 feet broad, with deep water close alongside the south side of the yard. The harbour is easy of access, safe, and capacious. The most prominent objects in the approaches to Portsmouth, are Fort Constitution and Portsmouth lighthouse, standing on Fort point, which divides Outer from Inner harbour; Whales Back lighthouse; the Quarantine establishment on Wood island, and Agamenticus hill 650 feet high situated 10 miles north eastward from Portsmouth.

LIGHTS.—Whales back.—On Whale's Back ledge, near the eastern entrance point of Portsmouth harbour, is a gray tower, 69 feet high, which exhibits, at 60 feet above high water, a *fixed* white light, varied by a *white flash every minute and a half*, visible in clear weather from a distance of 13 miles. The light is obscured when bearing between S. by E. $\frac{3}{4}$ E. and S.S.E. $\frac{1}{2}$ E.

Fog signal.—A fog trumpet is sounded in thick weather, giving blasts of *ten seconds* duration *every half minute*.

Portsmouth Harbour (New Castle).—On Fort point is a white tower, 60 feet high, which exhibits, at the height of 70 feet above high water, a *fixed* white light, visible in clear weather from a distance of 14 miles; excepting between the bearings of S.E. through east to N.E.

Isles of Shoals.—On White island, the south-west island of Isles of Shoals, is a white tower, 40 feet high, which exhibits at the height of 82

* See Admiralty plan :—Portsmouth harbour, No. 2,487; scale, $m = 3\cdot 6$ inches.

feet above high water, a light showing *red* and *white flashes* alternately, *every fifteen seconds*, and visible from a distance of 15 miles ; excepting when bearing between S. by W. $\frac{1}{4}$ W. and S. by E. $\frac{1}{4}$ E.

DANGERS OUTSIDE THE ENTRANCE.—**Gun Boat shoal**, with $3\frac{1}{2}$ fathoms water, lies S. $\frac{1}{2}$ W. 3 miles from Portsmouth lighthouse, and S. $\frac{1}{2}$ E. $1\frac{4}{10}$ miles from Odiorne point ; the sea breaks on it in rough weather. South of Gerrish island are numerous small islands, rocks, and reefs.

Kitt rocks, three in number, with 10 to 16 feet water on them, are the southernmost of these and are the greatest obstructions near the entrance. The middle and southern rock with 14 feet water over it lies S.S.E. one-third of a mile from Whales Back lighthouse ; and is marked by a red buoy (automatic whistle) placed in 6 fathoms on its south side.

Philip rocks, with 9 feet water on them lie E. by S. seven-eighths of a mile from Whale's Back lighthouse, E. by N. from Kitt rocks, and two-thirds of a mile from the shore of Gerrish island.

West Sister, a rock above high water, lies N.E. a quarter of a mile from Philip rocks.

East Sister, also above high water, lies N.E. half a mile from West Sister, E. by N., nearly $1\frac{1}{2}$ miles from Whales Back lighthouse ; and distant one-third of a mile from high-water mark on Gerrish island.

York ledge, dry at low water, situated S. by W. $4\frac{1}{2}$ miles from cape Neddick, and E. by N. 5 miles from Whales Back lighthouse, has erected upon it an iron cage beacon, from which sunken rocks extend N.E. nearly half a mile.

Stones rock dry at low water, lies S. by W. $\frac{1}{4}$ W. $1\frac{1}{4}$ miles from the south-west entrance point of York river, and half a mile off shore ; the eastern extreme being marked by a black beacon. A shoal of 3 fathoms lies S.W. $\frac{1}{4}$ W., half a mile from Stones rock.

Murray rock, with 6 feet water on it, is situated S.W. $1\frac{1}{2}$ miles from York ledge beacon. A red and black horizontally striped nun buoy, is placed in $6\frac{1}{2}$ fathoms south of the rock. Foul ground with depths varying from 4 to 6 fathoms, extends from Murray rock north one mile, and W.N.W. to the shore, under the general name of the Triangles.

On the south-east side of Isles of Shoals, are Anderson ledge dry at low water, and Cedar island ledge, also dry at low water ; situated respectively S.E. by E. $\frac{1}{2}$ E. one mile, and E. by N. $1\frac{1}{4}$ miles, from White island lighthouse.

DANGERS WITHIN THE ENTRANCE.—**Stielmann rocks**, a dangerous sunken reef, a quarter of a mile S. $\frac{1}{2}$ W. from Portsmouth lighthouse, extend 350 yards from the high-water mark of Great island shore. A black nun buoy is moored in 5 fathoms on the eastern side of these rocks.

Fishing islands lying off the north-west side of Gerrish island form the south point of Pepperel cove. A red spar buoy is placed on the edge of the shoal water west of the north Fishing island.

Logy ledge, is situated in the middle of Pepperel cove and bears N.N.E. $\frac{1}{4}$ E. from Portsmouth lighthouse ; the mark to clear it when beating, is the south point of Seavy island open to the southward of Clarks island. A red and black horizontally striped spar marks the south-east edge.

Cod rock, with 16 feet water on it, lies N.W. $1\frac{1}{2}$ cables from Fort point, and has a black spar buoy placed north-east of it in 5 fathoms water.

Goat island shoal, on the south side of the channel, extends half a cable north from the east extreme of Goat island, and is marked by a black spar buoy.

South Beacon shoal extends east 2 cables, from One Tree island, near the east side of the city of Portsmouth. At $1\frac{1}{2}$ cables East from One Tree island, the shoal dries at low water, and has erected upon it a gray stone beacon, with mast and diamond. The eastern extreme of South Beacon shoal, is marked by a black spar buoy placed in 4 fathoms.

Gangway rock lies N.N.E. $\frac{1}{4}$ E. nearly a cable from South beacon ; the north side is marked by a red and black horizontally striped spar buoy.*

North Beacon shoal, on the north side of the channel, surrounds Pumpkin island, and on the south side of the shoal is built a red beacon with mast and diamond which bears North 3 cables distant from South beacon shoal.

Willey ledge beacon, painted red, and surmounted by a copper cylinder and gilt ball, lies W.N.W. 2 cables from North beacon. It is erected upon a ledge of rocks, lying on the south side of Badger island.

Hicks rocks, dry at low water, extend S.W. 2 cables from the eastern entrance point of Spruce creek, and are marked by a red spar buoy.

Directions.—There are several channels by which the entrance to Portsmouth harbour may be approached, the best of which, especially at night, is that west of Isles of Shoals. If proceeding by this channel, after

* Operations for removing this rock were in progress in 1879.

passing White island light bring Portsmouth lighthouse to bear N. $\frac{1}{2}$ W. and steer for it, passing half a mile east of Gunboat shoal. When Whales Back light bears S.E. by E., alter course to N. $\frac{3}{4}$ E. to avoid Stielman rocks. As soon as Portsmouth lighthouse bears W. by S. $\frac{1}{2}$ S. steer N.W. $\frac{1}{4}$ N. until the same light bears S. by E. when temporary anchorage may be obtained in 8 to 9 fathoms water; or if bound to the city steer W. $\frac{1}{2}$ N. for fort Washington and when the two ship houses on Navy island open west of Seavy island (North) a N.N.W. $\frac{1}{4}$ W. course will lead up to Gangway rock buoy. Pass east of the latter and between it and North beacon and anchor as convenient off the city. In approaching Portsmouth harbour between Isles of Shoals and Murray rock; give Duck island the northernmost of Isles of Shoals, a berth of one mile, and steer W.N.W. till Portsmouth lighthouse bears N. $\frac{1}{2}$ W. When proceed as before directed.

At night, bring Portsmouth light to bear N.W. $\frac{3}{4}$ W.; stand on this course until White island light bears S.W. by S. then steer W.N.W. till Portsmouth light bears N. $\frac{1}{2}$ W. when resume the same courses as directed above.

From the northward, west of York ledge.—When half a mile from cape Neddick, steer S.W. by S. passing three-quarters of a mile west of Murray rock. When Portsmouth lighthouse bears N.W. $\frac{3}{4}$ W., steer West, until it bears N. $\frac{1}{2}$ W., when proceed as before directed.

Between York ledge and Boon island lighthouse.—Bring the latter to bear East, distant $1\frac{1}{2}$ miles, and steer S.W. by W. When Portsmouth lighthouse bears N.W. $\frac{3}{4}$ W. steer west until it bears N. $\frac{1}{2}$ W., and proceed as before directed.

Working into Outer harbour.—Stand to the westward until Portsmouth lighthouse bears N. $\frac{3}{4}$ E., and to the eastward while south of Wood island, until Portsmouth lighthouse bears N. by W. $\frac{1}{2}$ W. When north of Wood island, stand to the eastward until Whale's Back lighthouse is seen just open west of that island. Give the buoys on Kitt rocks and Stielman rocks a good berth, and in beating up Inner harbour give the buoys, marking the ledges on the port hand, a berth of 30 feet.

In approaching Portsmouth in thick weather from the eastward Jeffrey ledge, with 18 to 40 fathoms, lying 20 miles from the coast will serve as a good guide to the ship's position. When west of Jeffrey ledge, the shore should not be approached to less than 50 fathoms, which depth will be found at an average distance of 10 miles from the coast between cape Elizabeth and Portsmouth, and within one mile only of Boon island ledge.

Tides.—It is high water, full and change, in Portsmouth harbour, at 11h. 23m.; springs rise $9\frac{1}{4}$ feet, neaps $8\frac{3}{4}$ feet.

The depths on the shoals in the vicinity of Portsmouth are above mean low water; at the lowest tides there is $1\frac{1}{2}$ feet less. Both flood and ebb streams run with considerable velocity in Portsmouth harbour, and both set towards Fort point; caution is therefore necessary.

ICE.—Portsmouth harbour has been frozen across only on three occasions during the present century, and then but for a few hours, so that the navigation may be considered as always open. The greatest danger is incurred from drift ice, which forms in the upper waters of Piscataqua river and is brought down by the ebb stream.

NEWBURYPORT is situated $1\frac{3}{4}$ miles above the mouth of Merrimac river into which not more than 4 feet can be carried at extremely low tides, by a constantly changing channel.

LIGHTS.—On the north extreme of Plum island, forming the south entrance point of Merrimac river, is erected the principal lighthouse, painted white, which from an elevation of 45 feet above high water, shows a *fixed* white light, visible 12 miles. Eastward 112 yards from it is a moveable beacon painted black and white, containing a *fixed* white light 21 feet above high water, and visible 8 miles. Lighthouse and beacon in line lead over the bar.

A black automatic whistling buoy is placed off the bar in 9 fathoms with Newburyport light bearing W. $\frac{1}{2}$ S. and Andrews point S.S.E. $\frac{1}{2}$ E.

Life saving stations are established at Rye beach, 4 miles south-west of Odiorne point near Portsmouth, and on Plum island, 2 miles southward of Newburyport lighthouse.

IPSWICH HARBOUR.—In 1878 the directions for entering were as follows. When in 8 fathoms water, bring the light beacon on with the harbour lighthouse, S.W. $\frac{3}{4}$ W. and run for it. Cross the bar on this line, passing south of the red spar buoy on North breaker and north of the black buoy on South breaker. Steer S.W. by W. $\frac{3}{4}$ W. for a red spar buoy on Inner spit, from whence steer for the southern part of Castle hill until a round hill on the south part of Great Neck bears W.N.W. Shape the course for this hill until off the mouth of Ipswich river, then steer north, and anchor inside of Plum island in 3 to 5 fathoms water. Only 5 feet can be carried over the bar at low water. The channel is constantly changing.

ANNISQUAM HARBOUR.—In 1878 the following were the directions for entering. Bring the lighthouse to bear South, run for it until Lobster rock beacon bears S. by W. $\frac{1}{2}$ W.; when steer S. by W. $\frac{3}{4}$ W.

until near the North Barn rock, when steer S.E. by S. until off the town. Anchor in 3 to 5 fathoms water. There are 6 feet only over the bar (at low water), which frequently changes. Vessels bound in should take pilots for Ipswich and Annisquam harbour.

LIGHTS.—Ipswich.—The lighthouse on the south side of the entrance to Ipswich harbour is white, 35 feet high, and exhibits, at the height of 45 feet above high water, a *fixed* white light varied by a white *flash every minute and a half*, and which should be seen in clear weather from a distance of 11 miles. The light is obscured between the bearings of South and East. From a moveable black beacon 200 yards north-eastward from the lighthouse is shown from an elevation of 15 feet above high water a *fixed* white light which in line with the lighthouse leads over the Bar.

Annisquam Harbour.—On Wigwam point, the east entrance point of Annisquam harbour, is an octagonal white tower, 34 feet high, which exhibits, at 45 feet above high water, a *fixed* white light, visible 12 miles; except between the bearings of N.N.E. $\frac{1}{2}$ E. through north to N.W. by W. $\frac{1}{2}$ W.

A life saving station is established on Davis Neck near Annisquam lighthouse.

ROCKPORT HARBOUR* is a small breakwater harbour in Sandy bay, on the eastern side of Cape Ann peninsula.

Tides.—It is high water, full and change, at Ipswich, at 11h. 26m.; springs rise 9 feet, neaps $8\frac{1}{2}$ feet. At Annisquam, at 11h. 0m.; springs rise $9\frac{3}{4}$ feet, neaps 9 feet. At Rockport, at 10h. 57m.; springs rise $9\frac{1}{4}$ feet, neaps $8\frac{1}{2}$ feet.

LIGHT.—Straitsmouth.—On Straitsmouth island, is exhibited from a white octagonal tower, a local light for Rockport and the channel inside Salvages rocks, the eastern one of which, 10 feet above high water, is marked by a red beacon, that bears E.N.E. $1\frac{1}{6}$ miles from Straitsmouth island lighthouse. It is a *fixed* white light, 28 feet above high water and visible seaward 10 miles, between the bearings of N. $\frac{3}{4}$ E. and E. $\frac{3}{4}$ S.

DANGER.—Londoner, a rock 200 yards in extent, which dries at low water, lies nearly half a mile S.E. by E. from Thatchers island south lighthouse, and has an iron shaft on it 40 feet high, surmounted by an octagonal lattice work 7 feet high and 5 feet in diameter, painted black.

* See Admiralty plan :—Rockport harbour, No. 2,895; scale, $m = 3\frac{1}{6}$ inches.

Directions.—Approaching Rockport harbour from the southward, bring Straitsmouth lighthouse to bear N.W. by N. which clears Londoner; then steer N.N.W. $\frac{1}{4}$ W. passing about 2 cables to the eastward and northward of Straitsmouth lighthouse, and midway between Straitsmouth island and Avery ledge, a rock with 4 feet water on it marked by a red spar buoy lying N.N.E. $3\frac{1}{2}$ cables from the lighthouse. When the lighthouse bears S.W. by S., steer W. by N. until the large granite factory in Rockport bears W.S.W.; then steer for it, passing midway between the entrance points of the harbour, and anchor in 11 feet at mean low water, or pass between the buoys to the pier heads.

From the northward there is no danger if Straitsmouth lighthouse be not brought to bear westward of South; this clears Avery ledge and Flat ground awash at low water springs (also marked by a red spar buoy) 6 cables N.N.E. of it. When the granite factory in the harbour bears W.S.W. steer for it.

Temporary shelter from southerly and westerly gales may be obtained in Rockport Outer harbour, in 6 to 8 fathoms, north-west of the breakwater.

CAPE ANN.—The name given to the whole peninsula separating Ipswich and Massachusetts bays, is between 5 and 6 miles long in an E.N.E. and W.S.W. direction, with an average breadth of $3\frac{1}{2}$ miles.

LIGHT.—The south-eastern extreme of cape Ann is named Emersons point, half a mile east of which is Thatchers island about 50 feet above high water. Upon the summit are erected two gray granite towers, 112 feet high, bearing from each other N. by E. $\frac{3}{4}$ E. and S. by W. $\frac{3}{4}$ W., distant 298 yards; each tower exhibits a *fixed* white light. Both lights are 160 feet above high water, and should be seen in clear weather from a distance of 20 miles. These lighthouses are remarkably prominent objects from seaward.

Fog signal.—A whistle is used during foggy weather, giving each minute a blast of *eight seconds* duration followed by an interval of *four seconds*, and a blast of *four seconds* duration, followed by an interval of forty-four seconds.

GLOUCESTER HARBOUR* the head-quarters of the fishing interests of Massachusetts, is situated on the south side of cape Ann. Its length N.N.E. and S.S.W. is $2\frac{1}{2}$ miles and breadth between the entrance points $1\frac{1}{2}$ miles.

LIGHTS.—Eastern Point.—On Eastern point, at the east side of the entrance to Gloucester Harbour, is a white tower, 33 feet high,

* See Admiralty plan :—Gloucester harbour, No. 2,882, scale $m = 3\cdot 5$ inches.

which exhibits, at 60 feet above high water, a flashing *red* light, with an interval of *five seconds* between each flash, visible from a distance of 13 miles ; except between the bearings of W. $\frac{1}{2}$ S., and S. $\frac{1}{2}$ E. when it is obscured by the land.

Fog signal.—A bell is sounded during foggy weather.

Ten Pound Island.—On Ten Pound island, in Gloucester harbour, situated N. by E. $1\frac{3}{10}$ miles from Eastern point lighthouse is an octagonal white stone tower, which exhibits, at 50 feet above high water a *fixed* white light, visible from the distance of 12 miles ; except between the bearings of N. $\frac{1}{2}$ W. round east to S.W. by W.

DANGERS SEAWARD OF TEN POUND ISLAND.—**Norman's Woe rock** above high water lies E.N.E. one third of a mile from Norman's Woe, a bluff 100 feet high forming the western entrance point of Gloucester harbour. Shoal water extends S.S.E. $1\frac{1}{4}$ cables from Normans' Woe rock.

Eastern point ledge extends south-westward a quarter of a mile from Eastern point, and the shoalest part with 7 feet water named Webber rock, bears S.W. by S. distant $1\frac{3}{4}$ cables from the lighthouse.

At one cable northward of Eastern point lighthouse, is the mouth of a shallow cove, from which Dog Bar extends west $2\frac{1}{2}$ cables and then N.N.W. $1\frac{3}{4}$ cables to the depth of 17 feet. At the bend is placed a red spar buoy in 15 feet water, bearing W. by N. $\frac{1}{2}$ N. $2\frac{1}{2}$ cables from Eastern point lighthouse.

Round rock shoal lying nearly in the middle of the entrance, has 11 feet water on it at the lowest tides, and bears N.W. by W. $\frac{3}{4}$ W. two-thirds of a mile from Eastern point lighthouse. A black spar buoy marks the southern edge of the shoal.

Ten Pound island ledge with 9 feet water on it lies one third of a mile S.W. $\frac{1}{2}$ W. from Ten Pound island. A red spar buoy is moored in 3 fathoms, westward of the ledge.

Field rocks, the northernmost of which dry at low water, are half a mile west of Ten Pound island, midway and in a line between Stage head and the point half a mile to the southward ; and a quarter of a mile from the western shore. A black spar buoy is placed in $2\frac{1}{2}$ fathoms off the south extreme of the rocks.

DANGERS INSIDE POUND ISLAND.—**Babson ledge**, with 10 feet water on it, lies $1\frac{1}{2}$ cables S.W. by S. from Fort point at the entrance of Inner harbour. A black spar buoy is placed in $2\frac{1}{2}$ fathoms south-east of the ledge.

Black rock, dry at half tide, lies three-quarters of a cable from the western part of Rocky Neck, on the south side of the channel; it is marked by a red beacon.

Elisha ledge, half a cable from the shore of Rocky Neck and a quarter of a mile E.N.E. from Black rock beacon, dries at low water, and is marked by a red spar buoy.

Pinnacle rock, on the north side of the harbour, has 9 feet water on it at ordinary tide, and deep water close round. It lies 120 yards S.W. from the end of the large wharf, and N.N.W. $\frac{3}{4}$ W. from Elisha ledge. Harbour rock and others are marked by iron beacons. The channel between Ten Pound island and the eastern shore is too much obstructed by rocks to be available.

Directions.—Approaching Gloucester harbour from the north-eastward.—To avoid the dangers off cape Ann, Straits-mouth lighthouse should not be approached within $1\frac{1}{2}$ miles, nor Thatchers island lighthouses within a mile until the southernmost lighthouse bears N.W., which leads south-west of Londoner. There is a channel to the westward of Thatchers island, but strangers should not attempt it. With Thatchers island lighthouses in line bearing N. by E. $\frac{3}{4}$ E. one mile distant, steer towards Eastern point S.W. by W. $\frac{1}{2}$ W. 5 miles. When Eastern point lighthouse bears North, distant two thirds of a mile, haul round the point and steer N.W. until Ten Pound island lighthouse bears N.N.E. $\frac{3}{4}$ E. Proceed for the light on this bearing, passing between Dog Bar and Round Rock shoal in not less than $4\frac{1}{2}$ fathoms. When half a mile from Ten Pound island or halfway between it and Black Bess point, steer E. by N. $\frac{1}{2}$ N. and anchor in South-east harbour in 5 or 6 fathoms, muddy bottom.

To enter Inner harbour.—When abreast Eastern point, distant half a mile from it, continue to steer N.W.; not bringing Eastern point lighthouse to bear southward of E. by S. $\frac{1}{2}$ S. until Ten Pound island lighthouse bears N.E.; in order to clear Round rock shoal; then steer N.E. $\frac{1}{2}$ N., passing to the westward of Ten Pound island ledge. When Ten Pound island lighthouse bears E.S.E., distant 300 yards, steer N.E. by E. $\frac{3}{4}$ E. into Inner harbour, and anchor in 3 to 4 fathoms.

Good anchorage can be obtained also between Ten Pound island and Stage head in 5 fathoms, sand and mud.

The depth of 20 fathoms will be found one third of a mile east of Salvages, and three-quarters of a mile south-east of Londoner and Eastern point ledge.

TIDES.—It is high water, full and change, at Gloucester at 11h. 2m.; springs rise 10 feet, neaps $9\frac{1}{4}$ feet.

The depths given on the Shoals unless especially mentioned, are above the level of *mean* low water. At the lowest tides there will be 2 feet less.

The flood and ebb streams are feeble, excepting near Black rock and Ten Pound island, on to both of which they have a tendency to set.

ICE.—During the severe winter of 1874–75 the navigation was closed to sailing vessels excepting with the assistance of tugs, between 14th of January and 4th of March.

SALEM HARBOUR* of considerable importance, is situated 14 miles south-westward from cape Ann, and the same distance north-eastward from Boston. It is the south-westernmost of four harbours, contained in a deep indentation, the entrance points to which, are Gales point on the north-east, and Marble head on the south-west side. Seaward of the harbours are numerous islands and shoals, the chief passages through which are Main Ship and Cat island channels.

DANGERS on the north side of Main Ship channel.—**Gales ledge**, with 4 feet water on it, and marked with a red spar buoy, placed on the south of it, lies N.E. by E. $\frac{1}{4}$ E., $1\frac{1}{4}$ miles from Bakers island lighthouses.

Pilgrim ledge, with 19 feet water, also marked with a spar buoy, is a quarter of a mile west from Gales ledge.

Whale's back dries at three quarters ebb, and is marked by a red beacon built on the eastern part of the rock, bearing N. by E. $\frac{1}{2}$ E. two-thirds of a mile from Bakers island lighthouses.

Misery and John's ledges are two patches, with 10 feet water over them marked by spar buoys painted red and black in horizontal stripes; they lie W. by N. $\frac{1}{2}$ N. from the south point of Little Misery island, the westernmost being two thirds of a mile from it.

On the south side of Main Ship channel.—In a S.E. by S. direction from Bakers island are several shoals, the outermost of which are South-east or Outer breakers, distant $1\frac{3}{4}$ miles from the island; this patch is divided into two parts, the northern of which has only 4 feet and the southern 9 feet water on them; they are marked by a red spar buoy placed south of the southern portion. Within this shoal are middle breakers, with 2 feet water on them; Inner breakers, dry at low water, bearing S.S.E. distant one mile from Baker island lighthouses and Searls rock, with 8 feet S.E. $\frac{1}{4}$ S. half a mile from the same; the latter is marked with a black spar buoy moored on the north-east side. The lighthouses

* See Admiralty chart:—Salem and Marblehead harbours, No. 2,427, scale, $m = 3\cdot 0$ inches.

on Bakers island in line, bearing N.W. clear them all but Searls rock, to pass north-east of which keep the north-western or low lighthouse, open north-eastward of the south-eastern.

Bakers island shoal, to the depth of 15 feet, extends 3 cables off the north-west side of Bakers island, the north-eastern edge being marked by a black spar buoy, placed in 16 feet.

Powers rock with 9 feet water, is situated on the north-eastern edge of this bank, N.N.W. $\frac{1}{2}$ W. from Bakers island lighthouses, and half a cable from low water mark.

Hardy rocks which dry at half tide are the shoalest parts of a patch, 3 cables long, having a red beacon near the centre which bears W. by N. 6 cables from Bakers island lighthouses.

Hardy rock shoal, with 2 feet water over it, lies N.E. one cable from Hardy rocks beacon, and is marked by a black spar buoy, placed on north-east of it in 3 fathoms.

House, and Bowditch ledges, lie W.N.W. three-quarters and $1\frac{1}{2}$ miles respectively from Baker island lighthouses ; the former has 5 feet water on it, and is marked by a red and black horizontally striped spar buoy. Bowditch ledge dry at low water has erected upon it a stone beacon with a mast and cage painted black.

DANGERS in the approach to SALEM INNER HARBOUR.—Great Haste island, lies $2\frac{1}{2}$ miles W. $\frac{3}{4}$ N. from Bakers island lighthouses. Little Haste dry at two-thirds ebb, lies half a cable N.W. by N. from Great Haste ; on it is erected a black beacon.

Haste rock, with 8 feet water on it, lies $1\frac{3}{4}$ cables S.E. by E. $\frac{1}{2}$ E. from Great Haste ; it has a black spar buoy moored on the eastern side of it.

Haste shoal extends N.N.W. $1\frac{1}{2}$ cables from Little Haste beacon ; black spar buoy marks its northern point with 16 feet water. Hospital point lighthouse N.W. until Fort Pickering light bears S.W. by W. $\frac{1}{2}$ W. clears this shoal as well as in the shoal water off the north-east extreme of Middle ground.

Middle ground extends one mile in a N.E. and S.W. direction, is dry at low water in some parts, and lies immediately off Marblehead peninsula that separates Salem and Marblehead harbours.

The south-west point of Middle ground is marked by a black stone beacon on Great Aqua Vitæ, a cluster of rocks dry at low water, this beacon is E. by S. $\frac{1}{2}$ S. 4 cables from Fort Pickering lighthouse.

Knapp rock, with 8 feet water, lies West one cable from Great Aqua Vitæ beacon, and is marked by a red spar buoy. From Knapp rock, the

western edge of Middle ground trends north-east to a black spar buoy in 12 feet water, bearing N.N.E. $\frac{1}{2}$ E. $2\frac{3}{4}$ cables from Great Aqua Vitæ beacon.

Nearly 3 cables N.E. $\frac{1}{2}$ E. from Fort Pickering lighthouse is a square granite beacon, painted red, on Abbott rock, dry at low water, between which and the lighthouse, shoal water extends a cable into the channel.

Derby wharf light kept in sight south-east of Fort Pickering light clears Abbott rock.

Half tide rock awash at low water lies S.W. 2 cables from Fort Pickering light and is marked by a red spar buoy placed on its south side.

LIGHTS.—Bakers island, 35 feet above high water, is situated near the eastern entrance to, and on the south side of, Main Ship channel. Near its north extreme are erected two white towers, 52 and 29 feet high, S.E. and N.W., 13 yards from each other. A *fixed* white light is exhibited from each tower, 82 and 59 feet above high water respectively; they should be seen from a distance of 15 and 13 miles.

Fog signal.—In thick or foggy weather a bell is sounded. The bell tower is red, and stands north of the south-eastern lighthouse.

Hospital point.—On Hospital point the north-east entrance point of Beverly harbour, is erected a lighthouse, 39 feet high, and painted white, from which is exhibited a *fixed* white light, elevated 63 feet above high water, visible from a distance of 13 miles. This light appears more brilliant when in the centre of the channel between Bakers island and Little Misery island, than on either side, and thus seen serves as a leading mark to clear the dangers on each side of the channel.

Fort Pickering is built upon the north entrance point of Salem harbour, and near it is erected a lighthouse painted red, 23 feet high, exhibiting a *fixed* white light, 32 feet above high water, visible 10 miles. This light is obscured when bearing south of S. by W. $\frac{3}{4}$ W.

Marblehead.—Marblehead neck forms the south-east side of Marblehead harbour; on its north-east extreme, named Marblehead point, stands a white tower 23 feet high, from which, at the height of 43 feet above high water, is exhibited a *fixed* white light; in clear weather it should be seen 11 miles, when bearing from S. by E. $\frac{1}{4}$ E. round west and north to E. by N. $\frac{1}{4}$ N.

Derby Wharf.—On the southern extreme of Derby wharf, Salem, is shown a *fixed red* light, from an elevation of 22 feet above high water, which should be seen 9 miles.

Directions by Main Ship channel.—Coming from the eastward, bring Bakers island lighthouses to bear N. by W. and steer for them until within a little over a mile from them, when the depth will be 14 fathoms, over hard bottom, and Hospital point lighthouse will bear W. by N. $\frac{3}{4}$ N. Alter course now for the latter, keeping it ahead until 1 $\frac{1}{2}$ cables north of Bowditch ledge beacon, when steer W. by N. for the southern part of the town of Beverly, carrying not less than 6 fathoms water, until Derby wharf, and Fort Pickering lights are in line bearing S.W. by W. $\frac{3}{4}$ W. Steer this course with not less than 4 $\frac{1}{2}$ fathoms, until Hospital point lighthouse bears N. $\frac{3}{4}$ E., when keep S.W. $\frac{3}{4}$ W., into the harbour, and anchor when Derby wharf light tower bears West, in 3 $\frac{1}{2}$ fathoms, over mud.

Coming from the southward, vessels generally take Cat island channel, but if entering by Main Ship channel, steer for Eastern point lighthouse, bearing N.E. $\frac{1}{2}$ E., until Bakers island lighthouses bear W. by N. $\frac{1}{2}$ N., and Hospital point lighthouse W. by N. $\frac{3}{4}$ N., the depth of water being 22 fathoms over gray sand. Steer for the latter and proceed as before directed.

At night continue the W. by N. $\frac{3}{4}$ N. course for Hospital point light, carrying 5 $\frac{1}{2}$ fathoms until Derby Wharf and Fort Pickering lights are in line S.W. by W. $\frac{3}{4}$ W., when proceed as before directed.

Working for Main Ship channel, when north of Half-way rock, vessels standing to the southward and westward must keep Bakers island low north-western light in sight eastward of the high south-eastern light, to clear the South-east breakers and Searls rock. In standing northward, Bakers island lights must not be brought to bear south of W. by S. to clear Gales ledge.

Fort Lee on Salem Neck, open south of Little Misery island bearing west, leads south of Gales ledge and Whale's Back.

Manchester Roads, situated between House and Misery islands and the north shore, afford good anchorage in 3 to 6 fathoms, mud, and shelter from all winds, but southerly gales.

To enter this roadstead, steer W.N.W. for Little Misery island, until Bakers island lighthouses bear S. by E. distant about half a mile. Now alter course to N. by E. $\frac{1}{2}$ E. for the wooded hill situated a little westward of Glass head, and when past Saulis ledge buoy, steer N.N.W. for Chubb island, anchoring as convenient.

Cat island channel is between Bakers and Cat island, the latter being situated S.W. by W. distant 1 $\frac{1}{2}$ miles from the former, but the navigable channel is narrowed to 4 cables by rocks and shoals.

Halfway rock, 25 feet high, may be considered the starting point at the entrance of Cat island channel; it lies nearly midway between Bakers and Cat islands, and bears E.S.E. from the beacon on the south

end of Cat island; it is steep-to and may be approached to a cable on all sides. This rock is almost invariably made by vessels when taking Cat island channel, as it is only dangerous on very dark nights and in thick fogs.

DANGERS on the north-east side of Cat island channel.—South-east or Outer breakers are already described, the south part of which lies N.E. by E. nearly a mile from Half-way rock.

Gooseberry islets and shoals, immediately southward of Bakers island, are of considerable extent, the south-east point, known as Dry breakers, extending from Bakers island toward Half-way rock nearly a mile. Westward of this shoal is Gooseberry ledge, a small patch with 14 feet water on it, marked with a spar buoy painted with red and black horizontal stripes, bearing N.W. $\frac{3}{4}$ N. $\frac{1}{8}$ miles from Half-way rock. Three-quarters of a mile N.W. $\frac{1}{2}$ W. of Gooseberry ledge, (or in a line parallel with the channel course,) are Brimble rocks, awash at low water. They are marked with a black spar buoy, and lie N.E. by E., 6 cables from the north part of Cat island.

Eagle island is small and lies N.N.E. two-thirds of a mile from Cat island.

Eagle island bar parts of which are awash at low water springs, extends from Eagle island north-west nearly half a mile.

Mid-channel rock lies W. by S. a quarter of a mile from the south-west point of the island, and N. $\frac{1}{2}$ E. half a mile from the north point of Cat island; it has 16 feet water on it, and is marked with a red spar buoy. From Mid-channel rock the western portion of Eagle island shoals bears N. by W., and to their furthest point the distance is 4 cables.

On the south side of Cat island channel.—Between, and in a line with Half-way rock and the north side of Cat island, is Satan rock, a small flat rock, dry at low water, having a red beacon erected upon it, which bears East half a mile distant from the beacon on Cat island. It has deep water around it, and may be approached within a cable.

Martin rock is a small sunken rock with 12 feet water on it, 2 cables E. by N. from the north end of Cat island. A black spar buoy is moored in $3\frac{1}{2}$ fathoms on the eastern side of this rock.

Chappel ledge, with 15 feet water, marked with a red and black horizontally striped buoy, bears W.S.W. 4 cables from Mid-channel rock, and N.W. $\frac{1}{2}$ N. half a mile from the north extreme of Cat island.

Between Chappel ledge and Haste rock (already described) near the north-east point of Middle ground, is a cluster of rocks and shoals extending from Coney island. The principal of these lying in the way of

navigation, are Coney island ledge, dry at low water; and Coney rock, with 13 feet water on it; situated S.E. one quarter of a mile, and N. E. by E. $1\frac{1}{2}$ cables respectively, from Coney island. Coney rock is marked by a black spar buoy.

Directions for Cat island channel.—From just within Half-way rock a N.W. $\frac{1}{2}$ W. course (keeping Half-way rock on the opposite bearing) leads clear to a position midway between Chappel ledge and Mid-channel rock, and when the south extreme of Eagle island is in line with Bakers island lighthouses bearing E. by N. $\frac{3}{4}$ N. in daylight or Marblehead light bears S.W. $\frac{1}{4}$ S. at night steer N. by W. $\frac{3}{4}$ W. until Fort Pickering lighthouse bears W. $\frac{1}{2}$ S. and Bakers island lighthouses bear E. $\frac{3}{4}$ S. Thence steer N.W. northerly for Hospital point lighthouse carrying not less than $4\frac{1}{2}$ fathoms until Derby wharf and Fort Pickering lighthouses are in line bearing S.W. by W. $\frac{3}{4}$ W., when proceed for them as before directed.

The least water in Cat island channel at mean low water on the above courses is $4\frac{1}{2}$ fathoms.

MARBLEHEAD HARBOUR.—**Directions.**—From the position between Chappel ledge and Mid-channel rock, in Cat island channel already described, a S.W. $\frac{1}{2}$ W. course will lead direct into this harbour, carrying not less than 4 fathoms water.

If coming from the southward the course from about a mile south-east of Nahant head is N.E. $\frac{1}{4}$ E. until Marblehead lighthouse bears N.N.W., when it should be steered for until Bakers island lighthouses bear N.E. $\frac{1}{4}$ N., when a North course should be steered until Marblehead lighthouse bears W. by N. $\frac{1}{2}$ N., passing $1\frac{1}{4}$ cables eastward of Marblehead rock, with not less than $4\frac{1}{2}$ fathoms. Thence steer N.W. $\frac{1}{2}$ N. until Marblehead lighthouse bears S. by W. $\frac{3}{4}$ W., when proceed S.W. $\frac{1}{2}$ W. into the harbour, anchoring off the town in 3 to 4 fathoms soft bottom. If from the eastward, after passing Halfway rock bring Marblehead lighthouse to bear W. by N. $\frac{1}{2}$ N. and steer for it on that bearing until Bakers island lighthouses bear N.E. $\frac{3}{4}$ E., when proceed N.W. $\frac{1}{2}$ N. as before directed. On the north-east side of the channel are two small patches; one with 16 feet water on it lying $1\frac{1}{2}$ cables S.W. by W. from Cat island beacon; the other, Archers rock, with 10 feet on it, marked with a red and black horizontally striped spar buoy, W. by S. $\frac{1}{2}$ S., 3 cables from the north extreme of Cat island.

A life-boat station is established at Manchester, and there are two life-boats in Marblehead harbour.

ICE.—On rare occasions the eastern limit of the ice reaches as far as Eagle island. Once every five years on the average it makes as far east as Great Haste; but ordinarily the outer limit only reaches to abreast Derby

wharf lighthouse. This portion of Salem harbour is usually closed during January and February.

TIDES.—It is high water, full and change, at Salem harbour at 11h. 13m.; springs rise 11 feet, neaps 9 feet. The tidal streams are scarcely appreciable. The depths on the shoals are above *mean* low water.

EGG ROCK, 60 feet high, is situated N.N.E., 9 cables from Nahant head, the dividing point between Broad sound and Nahant bay.

LIGHT.—On the summit of Egg rock is built the light-keeper's dwelling, painted white, from the top and centre of which is exhibited a *fixed red* light, elevated 87 feet above high water and visible 14 miles.

Shelter from westerly winds may be had under the shores of Nahant bay in 2 to 5 fathoms, in entering this bay from the eastward Egg rock light must not be brought to bear south of West to clear the south extreme of a group of rocks and shoals lying south-east of Phillips point. The south shoal of this group is named Outer breakers; it has 8 feet water, and is marked with a red spar buoy bearing E.N.E. $2\frac{1}{4}$ miles from Egg rock lighthouse.

Lifeboats are stationed at Phillips point and Nahant head.

BOSTON,* is the capital city of the State of Massachusetts, with a population in 1880 of 362,535, and employs a large amount of shipping in the foreign and coasting trade. Boston harbour, including the subordinate ports of Neponset, Weymouth, Hingham, Cambridge, and Charlestown, occupies the western portion of Boston bay. There are several passages into the harbour from seaward between the numerous islands and shoals which shelter it. Main Ship channel with 22 feet, and South channel of Broad sound with 20 feet, at mean low water, are the most suitable for vessels of heavy draught. These two channels unite between Deer and Long islands and expand into the capacious anchorage of President road. That portion of the harbour between Governor island and the city of Boston is named Inner harbour, into which 22 feet can be carried at mean low water.

Time Signal.—The instant of mean noon at Boston corresponding to 4h. 44m. 15·4 secs. mean time at Greenwich is given by the dropping daily of a ball from a mast surmounting a building near the Harbour Signal Office. The ball is hoisted close up at *two minutes* before noon.

At Charlestown, on the north shore, is situated the United States Navy Yard, of about 80 acres in area, with a capacious dry dock, 341 feet long, 60 feet wide, and having a depth of 25 feet over the sill. Large vessels can at all times lie afloat within 500 yards of the dock.

* See Admiralty chart:—Boston harbour, No. 2,871, scale, $m = 1\cdot 8$ inches.

LIGHTS.—Minot Ledge.—On Outer Minot ledge, one of the Cohasset rocks near the south-east entrance point of Boston bay, is a dark gray tower, 100 feet from the base to vane, which exhibits, at an elevation of 92 feet above high water, a *fixed* white light, visible from a distance of 15 miles.

Fog signal.—A bell is sounded during foggy weather.

Boston.—On Little Brewster island, at the north side of Main Ship channel, is a circular white tower, 80 feet high, which exhibits, at an elevation of 111 feet above high water, a *flashing white* light, showing a *white flash every half minute*, visible from a distance of 16 miles.

Fog signal.—During foggy weather a blast from a trumpet will sound for *seven seconds* at intervals of *forty-three seconds*.

Narrows lighthouse on the west extreme of Spit or Brewster bar extending from Great Brewster island, is a brown screw-pile lighthouse, which exhibits, at 46 feet above high water, a *fixed red* light, visible at a distance of 11 miles, when bearing between West, round north and east, to S.S.E. $\frac{1}{2}$ E.

Fog signal.—In foggy weather a bell is rung every *twenty seconds*.

Long island head.—On the north-east end of Long island is an iron tower, 35 feet high, painted white, and exhibits, at an elevation of 129 feet above high water, a *fixed* white light, visible 17 miles.

DANGERS in approaching the channels.—TheGraves, which have a white appearance, form, at low water, a connected and dangerous reef. At $2\frac{1}{4}$ cables N.E. $\frac{2}{3}$ N. from the main ledge is North-east Grave, dry at low water; N.E. 2 cables from it is placed in 12 fathoms water an automatic whistle buoy, the sound from which has been heard at a distance of 4 miles. From it Martin ledge bears S. $\frac{1}{4}$ W., $1\frac{2}{3}$ miles distant, and Boston lighthouse S.W. by S. distant 3 miles.

Long island lighthouse open south of The Graves leads south-east of N.E. Grave. In thick weather The Graves should not be approached to less than 14 fathoms water.

Martin ledge, with 16 feet water, situated nearly midway between The Graves and Thieves ledge, is marked by a red nun buoy on its east side. From this buoy Harding ledge bell-buoy bears S. $\frac{1}{4}$ E., distant nearly $2\frac{1}{2}$ miles. Between Martin ledge and Outer Brewster is Tewkesbury rock, with 9 feet water on it.

Boston ledge, with 15 feet water on it, is marked by a red spar buoy; from it Harding ledge bell-buoy bears S. by E. $\frac{1}{2}$ E., distant nearly 2 miles.

Harding ledge dries at low water, and is marked by an iron beacon, painted black. A bell buoy is moored E.N.E., $1\frac{1}{4}$ cables from the beacon in $7\frac{1}{2}$ fathoms water; from the buoy Boston lighthouse bears N.W. $\frac{1}{2}$ W. nearly $2\frac{1}{2}$ miles; Long island lighthouse N.W. by W. $\frac{2}{3}$ W., distant $5\frac{1}{4}$ miles.

Long island lighthouse, a little shut in south of point Allerton, leads south of Harding ledge.

Thieves ledge, with $4\frac{3}{4}$ fathoms water on it, lies E. by S. $\frac{1}{2}$ S. from Boston lighthouse, nearly $2\frac{1}{3}$ miles.

STELLWAGEN BANK, with 9 to 18 fathoms water on it, is situated between cape Ann and cape Cod. The shoalest part with 9 fathoms is near the south-west extreme, and bears N.N.W. $6\frac{1}{2}$ miles distant from cape Cod ; thence it extends, with a curve to the eastward, 18 miles in a northerly direction to its north extremity with 13 fathoms water, which bears S. by E. $\frac{1}{2}$ E. 16 miles distant from Thatchers island lighthouses, cape Ann ; and E. $\frac{1}{2}$ N. 22 miles distant from Boston lighthouse. The soundings close to its edge are from 20 to 30 fathoms, deepening rapidly eastward and westward ; the 100 fathoms line being a little more than 10 miles from its eastern side. Between the northern extremity and cape Ann the depths are from 30 to 55 fathoms.

Directions for approaching the channels.—Stellwagen bank forms an extremely valuable guide to vessels bound to Boston, especially in thick weather, as owing to the steepness of its east and west sides a single cast of the lead upon it is sufficient to determine a vessel's position with some degree of certainty.

The bottom in the vicinity of cape Ann is rocky, but towards cape Cod it is fine sand.

Approaching Boston bay from the vicinity of cape Cod, keep to the northward of the direct course if the wind be N.E., and to the westward if S.W., always making allowance for the tide.

With a leading wind the direct course may be made good on the flood, or northerly stream, but the ebb or southerly stream sets towards Minot ledge. Being close in with Cedar point, without having seen Minot ledge light during the night or thick weather in 10 or 12 fathoms, run North into 17 or 18 fathoms, and steer W.N.W. for Boston light.

From one mile north-eastward of the black spar buoy marking Davis ledge with $2\frac{1}{4}$ fathoms water, the outer of Stellwagen ledges, the course and distance to Boston lighthouse is N.W. by W. $\frac{1}{8}$ W. $7\frac{1}{2}$ miles. When Allerton point bears S.W. by W. $\frac{1}{2}$ W. alter course to W. by N. $\frac{1}{2}$ N., and as soon as Boston lighthouse bears N. $\frac{1}{8}$ W. it is advisable to wait for a pilot. These courses lead between Harding and Thieves ledges. In thick weather it is prudent to steer N.W. $\frac{1}{2}$ W. until up with Harding ledge, and then W.N.W., allowing for wind and tide, towards Boston lighthouse.

From the north-eastward and bound for Main Ship channel the course and distance from cape Ann to Allerton point is S.W. $\frac{1}{4}$ W. 24 miles. With the latter on this bearing, and Long island and Boston lights in line W. by

N. $\frac{1}{2}$ N. steer W. $\frac{1}{2}$ S. until Boston light bears N. $\frac{1}{8}$ W. These courses lead one mile north-west of Thieves ledge and not less than one third of a mile south-east of Martin and Boston ledges.

Working in Boston Bay.—A vessel working for Boston harbour in the day may stretch safely anywhere from Minot ledge to Nahant head, until up with The Graves on one side and Harding ledge on the other. The north-east part of The Graves must not be approached nearer than half a mile; at Harding ledge it is safe to go close to the bell buoy. Inside of the line from The Graves to Harding ledge, the lead should be kept going; vessels of light draught may stand to the southward to within half a mile of the shore, and to the northward to within three-quarters of a mile of the east end of Outer Brewster. When up with the Shag or Egg rocks go no farther north than to bring Boston and Long island lighthouses in line bearing W. by N. $\frac{1}{4}$ N., and in passing Allerton point be careful not to go between it and the black spar buoy N.N.E. one third of a mile from the point.

At night. Narrows light on West extremity of Brewster bar, brought just south of Long island light, bearing N.W. by W. $\frac{3}{4}$ W. leads north-eastward of Harding ledge, and northward of point Allerton buoy in 19 feet at low water. Vessels working for Boston harbour, will avoid Cohasset rocks and Harding ledge, by not bringing Boston light to bear north of W.N.W. When within 2 miles of Boston light, and eastward of Shag or Egg rocks go no farther north than to bring this light to bear West, and when near Shag or Egg rocks do not pass north of Boston and Long island lights in line, bearing W. by N. $\frac{1}{4}$ N.

Caution.—As a rule, in thick or foggy weather vessels approaching Boston bay should keep outside the depth of 20 fathoms, which will ensure being 3 miles from Cohasset rocks, and 5 miles from the shoals near the entrance to Boston harbour.

ANCHORAGES.—Vessels in bad weather near Nahant head, without a pilot, may anchor west of Nahant, in 5 to 6 fathoms, by opening Lynn harbour, and bringing Nahant head to bear E.N.E. Vessels waiting for a pilot, may anchor in Main Ship channel, anywhere between Boston lighthouse, and Nantasket beach.

Nantasket road, situated south, and west of George island affords excellent anchorage for all classes of vessels; the best shelter being with Boston lighthouse shut in northward of the south extreme of George island. Vessels drawing over 20 feet water, must keep the lighthouse open.

President road, is the name given to the spacious anchorage northward of Long island, the best holding ground in which, is south of the line joining Nick's Mate beacon, and Castle island.

Tides and Tidal Streams in Boston harbour.—It is high water, full and change, at Boston lighthouse, at 11h. 12m.; springs rise 11 feet, neaps $9\frac{1}{2}$ feet. At United States dry dock, Charlestown, at 11h. 27m.; springs rise $11\frac{1}{4}$ feet, neaps 10 feet.

Between point Allerton and Boston lighthouse, the flood or ingoing stream at its greatest strength, sets W. $\frac{1}{4}$ S. with an hourly velocity of $1\frac{1}{2}$ knots, the direction of the ebb at the corresponding period, being E. $\frac{3}{4}$ S. with the same velocity.

Between False spit beacon and Centurion buoy, the flood and ebb streams, during the period of their greatest strength, set respectively S.W. by W. $\frac{3}{4}$ W. $1\frac{1}{2}$, and E.N.E., $1\frac{1}{4}$ knots per hour.

Between Lovell and Gallup islands, these streams set N.W. by N. half a knot and N. $\frac{3}{4}$ W. one knot per hour respectively, the direction of the flood during the first quarter being S.S.E. and velocity one-third of a knot per hour. Between Long island lighthouse, and Deer island point beacon, the maximum velocity of the flood stream is $2\frac{1}{2}$ knots in a W. by S. $\frac{1}{2}$ S. direction; the ebb setting E. by S. $3\frac{1}{3}$ knots per hour. In South channel of Broad sound, the flood at its maximum velocity of one-third of a knot, sets W. by N. $\frac{1}{2}$ N.; and the ebb half a knot E. by S. $\frac{7}{8}$ S.

At two miles east of Boston lighthouse the tidal streams are weak. Between the lighthouse and point Allerton the flood sets up channel, but the ebb coming from Nantasket gut, sets somewhat across the channel towards Spit or Brewster Bar; care must be taken accordingly. The flood sets strong through Black rock channel on to George island; care must be taken therefore, after passing the beacon on False spit. The ebb sets strong through the same channel, and vessels coming down from The Narrows, between Lovell and Gallup islands, are in danger of being carried by it on Whiting ledge, or into Black rock channel. The flood setting between Gallup and George islands may, in light winds, carry a vessel westward out of Main Ship channel; but here the channel is clear and the anchorage is good.

In the north part of The Narrows, the flood, during a part of its period sets to the southward, but is not strong. The ebb, which is stronger, sets to the northward, and it requires a smart working vessel to beat down The Narrows against an ebb stream. Near Nick's Mate the ebb will, in a light wind, carry vessels out through the Broad sound channels.

In South channel of Broad sound, the ebb, after passing Ram head, sets to the eastward. Vessels are liable to be carried by it on Aldridge ledge. North of this ledge it sets in the direction of the channel. In Hypocrite

channel the tidal streams of flood and ebb set in the direction of the channel.

The depths given for Boston harbour are above the level of mean low water or 2 feet more than will be found at the lowest spring tides.

MAIN SHIP CHANNEL.—The eastern entrance points of this channel are Boston lighthouse and Allerton point; it also passes between Narrows lighthouse and George island; and between Lovell and Gallup islands, joining South channel of Broad sound between Nick's Mate and Deer island point beacons.

DANGERS in Main Ship channel.—From Allerton point, shoal water extends N.N.E. $3\frac{1}{2}$ cables, and is marked by a black nun buoy placed in $3\frac{1}{2}$ fathoms. In the same direction at 2 cables distant from the point, is erected a pyramidal beacon surmounted by a black cone, marking the north-eastern extreme of the rocks dry at low water.

Nash rock, small in extent with 13 feet water on it, lies S.W. $\frac{1}{4}$ W. $3\frac{3}{4}$ cables from Boston lighthouse, and on the north side of the channel. False spit beacon kept north of the hotel on Long island leads south of Nash rock.

A rock with 15 feet water on it lies $1\frac{3}{4}$ cables S. by E. from Boston lighthouse.

Centurion rocks.—Two in number with 14 feet water on them, on the south side of the channel, are situated S.E. by S., $3\frac{1}{2}$ and $4\frac{1}{2}$ cables from Narrows lighthouse. The northern rock is marked by a black and the southern by a red nun buoy. Shoal water extends from the east side of George island in an easterly direction nearly 3 cables, contracting the channel to $1\frac{1}{2}$ cables in width; the termination being marked by a black nun buoy, bearing S. $\frac{3}{4}$ W. 2 cables from Narrows lighthouse.

Toddy rocks with 11 feet water over them lie north 3 cables from the Nantasket shore and are marked by a black nun buoy.

Hunt ledge with 14 feet water on it is situated north $1\frac{1}{2}$ cables from Toddy rocks and its position is indicated by a red and black horizontally striped nun buoy. These buoys are to guide in entering Nantasket road.

Between Gallup and Lovell islands, at the narrows, the channel is less than a cable in breadth; a mid-channel course between them leads in the deepest water.

A shoal rock, lies on the north-east side of the Narrows, bearing N.W. $\frac{3}{4}$ W. distant $4\frac{1}{2}$ cables from Narrows lighthouse.

From the south-east point of Gallup island shoal water extends to the north-westward three-quarters of a mile towards Deer island, and terminates

in Nick's Mate knoll, having on it a black beacon, from which Narrows lighthouse bears S.E. $\frac{3}{4}$ E. $1\frac{1}{4}$ miles in line with the south-west extreme of Lovell island. On the extreme edge of the shoal water and about one cable north-east of Nick's Mate beacon is placed a bell buoy.

Seventy-four bar nearly all dry at low water, extends north-west from the north-west side of Lovell island $1\frac{3}{4}$ cables, and is marked by a red spar buoy placed in 17 feet.

North-westward $1\frac{1}{4}$ cables from Nick's Mate beacon is placed a black spar buoy on the north-west edge of Nick's Mate shoal.

Between President road and Boston.—The only channel fit for strangers, passes between Castle and Governor islands, and between Dorchester flats and Bird island ; the shoals in which, are marked by the following buoys :—

On the north-east side of the channel near President road is a bank $8\frac{1}{2}$ cables long in an E.S.E. and W.N.W. direction and partly dry at low water ; the south-east, south, and north-west extremes being marked by red nun buoys. Governor island point red nun buoy, lies S.W. by S. 3 cables from the south extreme of Governor island. A black spar buoy marks the outer part of Governor island shoal, which extends $3\frac{1}{2}$ cables westward from the north-west side of that island.

On the south-west side of the channel and south-eastward 3 cables from Castle island, is placed a black nun buoy, 50 yards east of Castle rocks, with 3 feet water on them. A little over half a mile N. by W. from Castle island is a black nun buoy marking the south-west side of the channel known as Upper Middle Bar. Slate rocks, dry at low water, situated on the north-east edge of Dorchester flats, are marked by a black nun buoy.

At 4 cables North from Slate rocks buoy, is a shoal spot with 14 feet water over it. Two small shoals $1\frac{1}{4}$ cables off the north-east point of Boston with 15 and 17 feet water bear respectively N.E. $\frac{3}{4}$ E. and N.E. by E. $\frac{1}{2}$ E. from Boston Slate house.

Directions by Main Ship channel to Boston.—When between Allerton point and Boston lighthouse with the latter bearing N. $\frac{1}{8}$ W. distant $3\frac{1}{2}$ cables, steer West passing one cable south of Nash rock buoy, until Narrows lighthouse is in line with False spit beacon (erected on the edge of the sand dry at low water close to the lighthouse) bearing N.W. $\frac{3}{4}$ N. This course leads in not less than 22 feet to the black nun buoy on the north extremity of Centurion ; thence a N.W. $\frac{1}{2}$ W. course with Nick's Mate beacon and the middle of Bunker's hill monument in line will lead up to the eastern end of Gallup island.

When the east point of Gallup island is abeam bearing S.W. the course through the Narrows is N.W. by N., keeping in mid-channel, and steering for the high land on Deer island, having Nantasket hill (about 125 feet high) astern. When Nick's Mate beacon bears W. $\frac{1}{4}$ N., distant a quarter of a mile, Deer island beacon will be in line with the south-west extreme of Apple island bearing N.W. Proceed for Deer island beacon on this course, until Long island lighthouse bears W.S.W. when steer W. $\frac{1}{2}$ N. into President road, and anchor south of the line of Nick's Mate beacon and Castle island.

If wishing to anchor in Nantasket road ; steer W. $\frac{1}{2}$ S. when between Boston lighthouse and Allerton point buoy, which will lead to the red nun buoy near the south extreme of Centurion rocks. Pass south of this buoy and haul over towards Windmill point, the eastern entrance point of Nantasket Gut, and if the weather be fine anchor as convenient in 3 to 8 fathoms, gravel and sand. To make the usual and surest anchorage ; steer W.S.W. from Centurion south buoy, until Long island lighthouse is well open west of the south-west extreme of George island, when alter course for Long island lighthouse and anchor in 3 to 4 fathoms sand, when Boston light is well shut in behind George island. Vessels drawing over 20 feet water should anchor south of the latter line.

From President road to Boston.—Continue the W. $\frac{1}{2}$ N. course from abreast Nick's Mate buoys, until the summit of the northern Spectacle island bears S.S.E. $\frac{1}{2}$ E., when steer N.W. $\frac{1}{2}$ N., passing south-west of Lower Middle bar red buoys, and north-east of Castle rock black buoy until abreast Upper Middle black buoy ; pass nearly half a cable north-east of this buoy, whence steer for the large brick buildings in Charlestown Navy yard, seen just open east of Bunker's Hill Monument, bearing N.W. $\frac{3}{4}$ N. When Boston State house bears N.W. by W. $\frac{3}{4}$ W., steer N.W. by W. until it bears W. by N. $\frac{1}{2}$ N., and anchor in 4½ fathoms off the southern part of the city.

The least water in that part of Main channel between President road and Boston is 22 feet at mean low water.

Clearing marks.—False spit beacon, kept a little north of the hotel on Long island, W. by N. $\frac{1}{2}$ N., leads south of Nash rock.

Long island light kept a ship's length open to the northward of Narrows light S.E. by E. $\frac{3}{4}$ E., leads south-west of Lower Middle.

Moon head open east of fort Independence on Castle island, leads close east of Upper Middle black buoy. From Castle island wharf to President road, a good leading mark, is a high steeple in the south part of Boston, in line with the north side of fort Independence.

Small vessels may approach Bird island flats with safety, by keeping

Long island lighthouse S.E. $\frac{2}{3}$ E., open south of the high part of Governor island. This mark answers for day or night; but for vessels of heavy draught at high water only.

BROAD SOUND, SOUTH CHANNEL, passes north-west of The Graves, Green, and Lovell islands, and south-east of the extensive shoal ground, stretching eastward from Deer island.

DANGERS in South Channel.—Coming from the northward, the first danger before reaching the channel proper is The Graves, already spoken of among the outer dangers.

Green island lies S.W. by W. $\frac{1}{3}$ W., $1\frac{3}{4}$ miles N.E. from Grave whistling buoy.

The Roaring Bulls or Sunken rocks are a cluster of rocks, some of which dry at low water. The westernmost rock bears E. $\frac{1}{4}$ N., $3\frac{1}{2}$ cables from Green island. These rocks nearly always show themselves by breaking, and are situated three-quarters of a mile south-eastward of the line of the leading mark into South channel. The mark to lead between The Graves and The Roaring Bulls, is Boston lighthouse, N.N.E. $\frac{3}{4}$ E. open east of Middle Brewster and between it and Outer Brewster. Long island lighthouse W. by S. $\frac{3}{8}$ S. open northward of Green island, leads north of The Roaring Bulls.

Maffit ledge, with 18 feet water over it, and Commissioners ledge with 15 feet lie respectively N.N.W. $\frac{1}{2}$ W. a quarter of a mile, and N.W. by W. $\frac{1}{4}$ W. half a mile from Green island. West, three quarters of a mile from Green island, is Devil's Back, a dangerous patch of rocks, some of which dry at extremely low tides, a quarter of a mile in extent; it is marked with a black can buoy at the northern extremity.

Aldridge ledge, with 4 feet water on it, lies S.W. by W. half a mile distant from Devil's Back buoy. The north side is marked by a black can buoy, placed in 5 fathoms.

Ram's head, a long spit dry at low water, extends N.E. by N., $3\frac{1}{2}$ cables from the north-east extreme of Lovell island, and at $1\frac{1}{2}$ cables farther in the same direction, there is only 6 feet water. A black can buoy in 4 fathoms, marks the north-east extreme.

Great Fawn Bar, extends in an easterly direction, a little more than a mile from the south-east side of Deer island. The portion dry at low water, extends E. $\frac{1}{2}$ N. $6\frac{1}{2}$ cables from the centre of the east side of Deer island. $1\frac{3}{4}$ cables westward of this extremity, is erected a red conical beacon. Great Fawn Bar buoy, can shaped and red, lies $6\frac{1}{2}$ cables

eastward of the beacon. Two shoal patches, with 11 and 9 feet water over them, lie respectively E. by S. $2\frac{1}{2}$, and S.E. $\frac{1}{2}$ E. 4 cables from Great Fawn Bar buoy.

The southern portion of this extensive shoal, is known as Little Fawn Bar, and is marked by a red can buoy, placed in 16 feet water, bearing South nearly 6 cables from Great Fawn beacon, and N.E. by E. $\frac{3}{4}$ E. $6\frac{1}{2}$ cables from Deer island point beacon. These two buoys lie half a mile northward of the fairway. Deer island point beacon painted red stands upon the southern extremity of a dry spit, extending S. by W. a quarter of a mile from the south extreme of Deer island. A rock dry at low water, lies E. by S. $\frac{1}{2}$ S., $1\frac{1}{8}$ cables from the beacon; the latter in line with the north side of Governor island, N.W. by W. $\frac{1}{2}$ W., leads south of the rock.

Directions for Broad sound, South channel.—From a position nearly three-quarters of a mile N.W. of North-east Grave whistling buoy, Nick's Mate beacon will be in a line with the middle of the north or highest of the Blue hills, S.W. by W. $\frac{1}{2}$ W. Keep this mark on until Deer island point beacon bears W. $\frac{1}{2}$ N. and Ram's head black buoy is passed, when steer for, the north-east extreme of Long island in line with the south extreme of the southern Spectacle island bearing W. by S. $\frac{1}{2}$ S., until Deer island point beacon bears N.W., thence steer W. $\frac{1}{2}$ N., following the directions given by Main Ship channel. The channel is short and straight, the marks clear, and vessels of large draught may resort to it with safety and convenience at half or three-quarters flood, especially in going out.

Caution.—East of Ram's head the ebb stream sets east; care must therefore be taken to avoid Aldridge ledge.

• **Hypocrite channel** is not to be recommended to strangers, unless in cases of extreme necessity. It is entered between Outer Brewster and The Roaring Bulls; thence it runs between Green and Little Calf islands, and westward towards Ram head, north of which it joins into South channel of Broad sound.

DANGERS.—A rock with 9 feet water over it lies N.N.W. nearly three-quarters of a cable from Little Calf island. The shoal water off Green and Little Calf islands may be avoided by keeping in mid-channel or $1\frac{1}{3}$ cables from the latter and the south-western dry rock of Green island.

Half-tide rocks, with 2 feet water, are situated W.N.W. 3 cables from Little Calf island. A red spar buoy is moored south of the rock; any part of The Graves open southward of Green island leads south of them.

A large patch lies between Half-tide rocks and Aldridge ledge, the shoalest part of which with 12 feet water is named Twelve feet rock.

Directions for Hypocrite channel.—Having North-east Grave whistling buoy bearing North, distant a little more than a mile, and Deer island point beacon West ; steer for the beacon seen midway between Green and Little Calf islands ; when past the latter and Narrows lighthouse bearing S.W., steer S.W. by W., keeping the south part of The Graves open southward of Green island until Boston lighthouse is shut in with the north-east extreme of Great Brewster, S. by E. $\frac{1}{4}$ E., when the red buoy on Half tide rocks will have been passed. When Deer island point beacon bears W. $\frac{1}{3}$ N., appearing just south of the south-west extremity of Castle island, steer for it, which course will lead into South channel of Broad sound.

Black Rock channel passes between Brewster bar and Lovell island, uniting Main Ship and Hypocrite channels, is unsuitable for strangers and is only used by heavy draught ships, when ice in the Narrows prevents egress by Main Ship channel. The principal danger is Whiting ledge, with 6 feet water over it, lying between the south extreme of Lovell island and Narrows lighthouse N.N.W. $\frac{1}{4}$ W., $1\frac{1}{4}$ tables from the latter.

When between Little Calf island and Half-tide rocks buoy, steer S.W. $\frac{1}{4}$ W. for the south-east angle of fort Warren on George island, passing between Whiting ledge and Narrows lighthouse, into Main Ship channel, where with Nick's Mate beacon and Bunker's Hill Monument in line, N.W. $\frac{1}{2}$ W. proceed as before directed.

Both the flood and ebb streams in this channel are strong, the former setting fairly through in the direction of the course, but the ebb sets in an easterly direction across the channel.

North channel is the name given to the line of deepest water over Great Fawn, and Little Fawn bars. Not more than 13 feet water at low tide, can be carried across, and none but vessels of very light draught or those locally acquainted, should attempt it.

Shirley gut, separates Deer island from the mainland ; it is narrow and crooked, and though it is possible to carry 13 feet through at low water, this channel should never be used by strangers under any circumstances.

Back or Western Way.—This channel, on the south-west side of Long and Spectacle islands, is used in light winds on the ebb, by vessels of moderate or light draught, there being but 9 feet at low water, to escape being set out into Broad Sound when near Nick's Mate, or through Black rock channel at the south extreme of Lovell island.

Directions.—From Castle rocks buoy steer S.S.E. for Great Quincy hill keeping nearly mid-channel between Spectacle and Thompson islands passing about half-way between Moon head and the south-west extreme of Long island. To clear Sculpin ledge dry in parts at low water, and marked by a red spar buoy placed on its east side, situated between Spectacle and Long islands; keep Governor island open west of Spectacle island bearing N. by W. When past the south-west extreme of Long island, the course is S.E. until the same extreme of Long island is touching the east side of Spectacle islands; then steer N.E. by E. $\frac{1}{2}$ E. leading about half-way between Bass point and Rainsford island. When well past Rainsford island steer E. by S. for the south part of George island, which course will lead north of Hospital shoal and the black nun buoy placed east of Wilson rock with 5 feet water and lead into Nantasket road.

System of buoyage.—In entering from seaward the buoys and beacons coloured red, are on the starboard, and those coloured black, are on the port side of the channel. Buoys coloured red and black in horizontal stripes are on Middle grounds.

Lifeboats are stationed on Deer island, Allerton point, Nantasket beach, and at $1\frac{1}{2}$ miles north-west of Cohasset harbour.

ICE.—In ordinary winters, steam, and sailing vessels assisted by ice tug boats, experience no difficulty in entering or leaving Boston harbour by Main Ship channel. South channel of Broad sound, and the minor passages are usually closed by ice. On account of the occasional displacement of buoys by drift ice, no vessel should attempt entering the harbour during the winter months without a pilot.

CAPE COD BAY is 20 miles deep, North and South, and about the same distance broad, East and West; its eastern entrance point cape Cod, being nearly 40 miles south-east from Boston. Within and south of the cape is the harbour of cape Cod or Provincetown. For all purposes of navigation the bay may be said to be free from dangers, there being none at a greater distance than a mile from the shore with the exception of Billingsgate shoal lying off the south-east side, and sheltering Wellfleet bay; Gurnet point which may be considered the western entrance point of cape Cod bay is about 34 miles from Boston and bears W. $\frac{1}{2}$ S. distant $16\frac{1}{4}$ miles from Race point, the western extreme of cape Cod.

LIGHTS in CAPE COD BAY.—**Plymouth (Gurnet).**—On Gurnet point, the north entrance point of Plymouth harbour, are two white octagonal wooden towers, 34 feet high, and 31 feet apart, bearing N.W. and S.E. from each other. They exhibit *fixed* white lights, each at an elevation of 97 feet above high water. The north-western

light is visible 11 miles, but the other being only intended for a leading mark, is of small power, and is only visible 6 miles.

The lighthouses in line bearing N.W. clear Brown bank.

Duxbury Pier.—Near Duxbury pier, in Plymouth harbour, a *fixed* white light is exhibited from an iron tower, painted red, at 35 feet above high water; the light should be seen 11 miles. In Cow Yard the light is obscured when bearing west of South.

Sandy Neck.—On the south-east extreme of Sandy neck, the western entrance point of Barnstable harbour, in the middle of the bight of cape Cod bay, a *fixed* white light is exhibited, at 55 feet above high water, from a white tower 44 feet high. It should be seen 12 miles.

Billingsgate island, at the entrance of Wellfleet bay has erected upon it a red tower, 34 feet high, from which a *fixed* white light is exhibited, at 48 feet above high water, visible 12 miles.

On Mayo beach at the head of Wellfleet bay is shewn from a white tower a *fixed* white light elevated 32 feet above high water, and visible 11 miles.

Cape Cod (Highlands Truro).—On the outer or north-east side of cape Cod, is erected a white lighthouse 53 feet high, which exhibits, at 191 feet above high water, a *fixed* white light seen in clear weather from a distance of 20 miles. In cape Cod bay this light is obscured when bearing north of N.E.

Fog signal.—In thick and foggy weather a trumpet will be sounded, giving blasts of *eight seconds* duration, at intervals of *thirty seconds*.

Long point.—On Long point shoal, the south-west entrance point of Provincetown harbour, is a brown tower 34 feet high, which exhibits, at 40 feet above high water, a *fixed* white light, visible from a distance of 11 miles.

In foggy weather a bell is sounded giving *two strokes in quick succession* followed by an interval of *thirty seconds*; then a *single stroke* succeeded by a *similar interval*.

Wood End.—On Wood End, near the entrance to Provincetown harbour, cape Cod, is a dark brown tower, which exhibits, at 40 feet above high water a *flashing red* light, the flash being shown *every fifteen seconds*, visible in clear weather from a distance of 11 miles.

Race point.—On Race point, the north-west extreme of cape Cod is a red tower, 35 feet high, which exhibits, at 46 feet above high water, a *fixed* white light, varied by a *white flash every minute and a half*, visible in clear weather from a distance of 12 miles. From the eastward the light is obscured when bearing westward of S.W. $\frac{3}{4}$ W. and from the southward when bearing north of N.N.W. $\frac{1}{2}$ W.

Fog signal.—A whistle is sounded during foggy weather, giving blasts of *four seconds* duration, followed by *alternate* intervals of *eight*, and *forty-four seconds*.

PLYMOUTH HARBOUR,* sheltered by the natural breakwater of Long beach, is small in extent, and is situated 3 miles westward of Gurnet point, easily recognized by its two lighthouses. The harbour contains good anchorage for small vessels, southward of the bar, over which 12 feet can be carried at low water. The only anchorage however for strangers, or vessels of heavy draught, is in Cow Yard, the southern part of Duxbury bay, in 3 to 6 fathoms good holding ground.

Both Cow Yard and Plymouth harbour are approached between Gurnet point and the east extreme of Brown bank, the western and dry portion of which is sometimes named Brown island. The channel, with 4 fathoms at low water varying from 4 cables to $1\frac{1}{4}$ cables in width between Brown bank on the sound, and the shoal water between Gurnet point and Duxbury pier on the north, is marked by 10 spar buoys, coloured in the usual way 5 on each edge of the channel. At Pier head the north extremity of Long beach, and S.S.W. $\frac{1}{2}$ W., half a mile from Duxbury pier lighthouse is erected a beacon, with staff and cage painted black.

Tides.—It is high water, full and change, at Plymouth, at 11h. 04 m.; springs rise $10\frac{3}{4}$ feet, neaps 9 feet. At Provincetown, at 11h. 22m.; springs rise 10 feet, neaps 9 feet.

Directions.—In approaching the entrance of the channel, keep Gurnet point lighthouses bearing between S. by W. $\frac{1}{2}$ W., (which passes east of the red spar buoys marking Howland and High Pine ledges,) and N.W., (the bearing of the lights in line, which leads east of Brown bank). With Gurnet point lighthouses in line N.W. distant rather over half a mile, and Duxbury pier lighthouse bearing W. $\frac{1}{3}$ S., steer W. $\frac{1}{2}$ S. until the latter bears W. by N. $\frac{3}{4}$ N.; when steer S.W. $\frac{3}{4}$ N. until Duxbury pier lighthouse bears N.N.E., and pier head beacon on Long Beach point bears S.S.W. $\frac{3}{4}$ W. If bound into Plymouth, steer W. $\frac{1}{3}$ S., and anchor when Gurnet point lighthouses are shut in with Beach point. If bound into Cow Yard; when Duxbury pier light bears N.N.E. steer N. by W. $\frac{1}{2}$ W., for the southern entrance to Cow Yard marked by two spar buoys, passing a cable westward of Duxbury pier lighthouse, and anchor in 3 to 5 fathoms in the vicinity of the red and black spars marking the entrance to Cow Yard, or proceed N.N.E. $\frac{3}{8}$ E., between these buoys, and anchor in Cow Yard in 3 to $6\frac{1}{2}$ fathoms.

In working into Plymouth harbour, do not stand to the northward into

* See Admiralty plan :—Plymouth harbour, No. 2,486, scale, $m=3\cdot64$ inches.

less than 3 fathoms; to the southward, the best guide is the ripple marking the edge of Brown bank, which can be distinctly seen except in very calm weather.

Ice.—Plymouth harbour, often called Inner harbour is obstructed by local ice, for a few weeks every other winter on an average; and during January and February the approaches are rendered hazardous by the amount of drift ice.

Lifeboats are stationed at Plymouth, on Duxbury and Long beaches, and on Manomet point 5 miles south of the entrance.

CAPE COD OR PROVINCETOWN HARBOUR.—This harbour of refuge affords good anchorage, and will accommodate a large number of vessels. It is so completely land-locked as to be secure against gales, and free from a heavy swell.

DANGERS.—**Shank Painter** and **Wood End** bars situated between Race point and Wood End, extend about half a mile from the shore.

Long point bar extends East a quarter of a mile from Long point lighthouse.

Extensive flats lie eastward of cape Cod harbour along the shore of Truro, shoaling gradually; and that shore should not be approached nearer than one mile.

Directions for entering Provincetown Harbour.—When Race point Lighthouse bears East, distant 2 miles, steer S.S.E. $\frac{1}{2}$ E., until cape Cod Lighthouse is sufficiently open south of Wood End lighthouse that the latter bears E. by N. $\frac{1}{4}$ N., when steer E. $\frac{1}{4}$ N. for cape Cod lighthouse. When Wood End and Long point lighthouses, bear W.N.W. and N.N.E. respectively, distant a little less than a mile. Steer N.E. until Long point lighthouse bears W. $\frac{1}{2}$ S., distant half a mile, thence N.W. $\frac{1}{4}$ N.; and when Long point light bears S.S.W. $\frac{3}{4}$ W., alter course to West, and anchor in 9 fathoms.

When past Race point light, and running round towards Provincetown harbour, cape Cod light open south of Wood End light, bearing East, leads south of Wood End bar.

Provincetown harbour is accessible with a north-east wind, but care should be taken, to keep close to the shore near Long point and stand on the port tack towards Truro, until the harbour can be made on the other tack; or the E. $\frac{1}{4}$ N. course may be continued towards cape Cod lighthouse, anchoring at discretion in 5 to 10 fathoms.

Anchorage.—Good anchorage may be found in a N.E. gale, by running for Race point lighthouse, passing it at a distance of one-third of a mile ; when it bears E.N.E., haul up E.S.E., and anchor in 10 to 4 fathoms water. The lead must be carefully attended to as the water shoals rapidly from 20 fathoms towards the shore.

Lifeboats are stationed at Race point lighthouse, Peaked hill Bar, and one mile north of cape Cod lighthouse.

ICE.—Provincetown harbour, is only obstructed by ice in very severe winters, and then seldom longer than a fortnight, in the latter part of February.

LIGHT.—**Nausett Beach** (beacons).—At Eastham, on the east side of cape Cod, are erected three circular towers, 150 feet apart, in line North and South, coloured white, and each exhibiting from an elevation of 93 feet above high water, a *fixed* white light, visible 15 miles excepting to the southward, where they are not visible when bearing north of N. by W.

NANTUCKET SHOALS,* extend eastward and south-eastward from Nantucket island, rendering this locality one of the most dreaded parts of the coast. These shoals have 6 feet to 4 fathoms water over them, and alter their positions after heavy gales. Coasting vessels almost invariably avoid them by passing through Nantucket and Vineyard sounds, while others usually pass east of them ; to the latter therefore Nantucket shoals are a great source of anxiety.

Phelps bank, the most south-easterly of Nantucket shoals, is $11\frac{1}{2}$ miles long in a N.E. by E. and S.W. by W. direction, and $1\frac{1}{4}$ miles broad, with 10 to 19 fathoms water. Its north-east extreme, with a depth of 17 fathoms, bears S.E. $\frac{1}{2}$ S. distant $38\frac{1}{2}$ miles from Sankaty head lighthouse, and E. by S. $26\frac{1}{4}$ miles, from Nantucket New South shoal light vessel ; the south-west extreme known as **Asia Rip**, with the depth of 11 fathoms, bearing S.S.E. $\frac{2}{3}$ E. distant 39 miles, and S.E. $\frac{3}{4}$ E. $20\frac{1}{4}$ miles, from the same lights respectively.

Fishing Rip, with $4\frac{1}{2}$ fathoms, least water upon it, is 9 miles long in a general N.E. and S.W. direction. Its south-west extreme bears E. $\frac{1}{2}$ N. distant $16\frac{1}{2}$ miles from Nantucket New South shoal light vessel and S. E. $\frac{1}{2}$ S. 28 miles from Sankaty head light vessel.

Davis bank is nearly 18 miles long, in a N.N.E. and S.S.W. direction, with depths varying from 14 feet to 10 fathoms over it. The former depth of water, is found only on a patch, situated near the northern extreme, named **Fourteen-feet shoal**, bearing S.E. by E. $\frac{5}{8}$ E., $19\frac{1}{4}$ miles

*. See Admiralty chart :—Nantucket shoals to Block island, No. 2,890; scale, $m=0\cdot 4$ of an inch.

distant from Nantucket lighthouse. A patch of 3 fathoms on Davis bank, lies S. E. $\frac{1}{4}$ S. $17\frac{1}{2}$ miles distant from Sankaty head lighthouse. The south extreme of Davis bank, with a depth of 7 fathoms water bears S.S.E. $\frac{5}{8}$ E. $21\frac{1}{2}$ miles distant from the same.

Great Rip, extends between 11 and 12 miles, in a N. by E. and S. by W. direction, and is almost connected with Nantucket island, by a succession of shoals. The northern portion of Great Rip, with 7 feet water over it, is named Rose and Crown, the north extreme of which bears East $10\frac{1}{2}$ miles from Sankaty head lighthouse. The middle and shoalest portion, is known as Four-feet shoal, the depth of water over it, being indicated in its name. It bears S.E. by E. distant $12\frac{3}{4}$ miles from Sankaty head lighthouse.

Nine-feet Rip, is the name given to the southern portion of Great Rip. It has 8 feet water over it, and bears S.E. $14\frac{2}{3}$ miles from the same light.

Northward of Great Rip, are Twelve-feet, and McBlair shoals, a description of which is given in connection with the eastern entrance to Nantucket sound. (See pages 70 and 71.)

Old South shoal, with 7 feet water, lies with its south extreme, bearing N. $\frac{1}{4}$ E., distant 9 miles from Nantucket New South shoal light vessel.

Davis New South shoal, with 8 feet least water over it, is the south-westernmost of Nantucket shoals. The western extreme of this shoal, bears N.N.W. $\frac{3}{8}$ W., $3\frac{1}{2}$ miles, and the eastern extreme N. by E. $\frac{1}{4}$ E., 3 miles distant, from Nantucket New South shoal light vessel.

Buoy.—A red can buoy, is placed in 14 fathoms water, about $1\frac{1}{4}$ miles northward of the light vessel, and between it and the shoal.

Directions for passing east of Nantucket Shoals.—
From Portsmouth.—With White island lighthouse bearing East, distant one mile, steer S. by E. $\frac{1}{2}$ E. until cape Ann lighthouses bear West, distant $6\frac{1}{2}$ miles, and depth of water 22 fathoms. A slight alteration of course to S. by E. $\frac{3}{8}$ E. will, if made good, lead to a position in lat. $41^{\circ} 12'$ N., long. $60^{\circ} 24'$ W., whence a S.W. by W. $\frac{3}{8}$ W. course, will lead to Nantucket New South shoal light vessel, in not less than 6 fathoms.

On the above courses, 16 fathoms will be found $2\frac{1}{2}$ miles distant from the east coast of cape Cod, with the lighthouse bearing N.W. $\frac{1}{2}$ N., distant 7 miles; the soundings will then gradually increase to 47 fathoms with Chatham lighthouses, bearing S.W. $\frac{7}{8}$ W., distant $9\frac{1}{2}$ miles, whence the water will gradually shoal to between 14 and 22 fathoms, to the termination of the S. by E. $\frac{3}{8}$ E. course; passing 10 miles eastward of McBlair shoal, 6 and 10 miles east, respectively, of Fourteen-feet shoal, and Rose and Crown. At the turning point the depth will be 23 fathoms, over fine, white sand, and broken shells, and the S.W. by W. $\frac{3}{8}$ W. course for the

light vessel, will lead $3\frac{1}{2}$ miles south-eastward of the middle of Davis bank, crossing its southern extreme in 6 fathoms.

From Nantucket New South shoal light vessel, the course and distance to Sandy Hook light vessel, is S. 81° W. (True); the course to Montauk point lighthouse W. by N, $\frac{1}{4}$ N.; to Block island north lighthouse N.W. by W. $\frac{1}{6}$ W., and to Judith point light N.W. by W. $\frac{3}{8}$ W.

From Portland.—A vessel should take her departure with cape Elizabeth lighthouses bearing N. $\frac{1}{6}$ W. distant 5 miles, and depth of water 25 fathoms, steering S. $\frac{1}{6}$ E. across the north-eastern extreme of Jeffrey ledge in 30 fathoms, coarse gray sand and black specks. Between Jeffrey ledge and cape Cod there will be found from 50 to 130 fathoms. In lat. $41^{\circ} 41'$ N., long $69^{\circ} 34'$ W., with Chatham lights bearing W. $\frac{3}{4}$ N. distant 17 miles, the depth will be 50 fathoms, shoaling gradually to 20 fathoms in lat. $41^{\circ} 25'$ N. long $69^{\circ} 27'$ W. with Nantucket (Great point) lighthouse bearing W. $\frac{3}{4}$ N. distant 26 miles. From this position the depths will vary from 14 to 25 fathoms, until the turning point in lat. $41^{\circ} 12'$ N. long $60^{\circ} 24'$ W. is reached whence proceed as above directed.

From the bay of Fundy.—With Brier island light bearing East, distant 9 miles, and depth of water 100 fathoms, mud, steer S. 35° W. (True) shoaling the water to 60 fathoms, with cape St. Mary bearing E. $\frac{1}{2}$ N. distant 30 miles; and again increasing the depth, until the position of lat. $42^{\circ} 54'$ N., and $67^{\circ} 44'$ W., is reached, where there will be 125 fathoms; in lat. $42^{\circ} 0'$ N., long. $68^{\circ} 37'$ W., N.W. by W. distant 41 miles from George shoal, there is a depth of 88 fathoms, blue mud, and sand. The course passes 30 miles westward of Cultivator shoal, with soundings varying from 60 to 85 fathoms, until in lat. $41^{\circ} 25'$ N., long. $69^{\circ} 12'$ W., where the depth is 47 fathoms over gray sand, and broken shells. From this position, the depth gradually decreases, until in lat. $41^{\circ} 12'$ N., long. $69^{\circ} 24'$ W., where it will be 23 fathoms, and the course S.W. by W. $\frac{3}{8}$ W., for Nantucket New South shoal light vessel (see page 3).

Passing eastward of Phelps bank.—In following the above mentioned directions, it must be borne in mind, that vessels pass *westward* of Fishing Rip with $4\frac{1}{4}$ fathoms, and Phelps bank with 10 fathoms least water over them. To pass eastward of the latter, from the bay of Fundy, a vessel should as before directed take her departure, with Bryer island light bearing East, distant 9 miles, and steer S. 30° W. (True) passing 25, and 15 miles, westward respectively, of George and Cultivator shoals. In the latitude of the former, the depths will vary from 75 to 120 fathoms, over mud, and green ooze, and when southward of Cultivator shoal, the soundings will decrease with great regularity, until the turning point of the course is reached, south of Phelps bank, in lat. $40^{\circ} 40'$ N. and

long. $69^{\circ} 19' W.$ Here the depth will be 32 fathoms over fine gray sand and black specks, with Nantucket New South shoal light vessel, bearing $N. W. \frac{1}{4} W.$ distant 28 miles. From this position the course for five fathom bank light vessel is $S. 65^{\circ} W.$ (True); for Sandy Hook light vessel $S. 86^{\circ} W.$ (True); for Montauk point light $N. 78^{\circ} W.$ (True), and for Judith point lighthouse $N. 67^{\circ} W.$ (True).

Soundings.—In approaching Nantucket shoals by the foregoing directions, a depth of 19 fathoms, fine sand, black specks, and broken shells, will indicate being $E.$ by $S. \frac{1}{4} S.$, distant $23\frac{1}{2}$ miles, from Sankaty head lighthouse, and on the east side of the shoals. When on the course given for Nantucket New South shoal light vessel, the soundings will be found very irregular, ranging from 6 to 25 fathoms, the shoal water almost invariably being over hard gray sand, while the deeper water is found over coarse gray sand, gravel, shells, broken shells, and pebbles. When westward of Nantucket shoals, and the water deepens to over 20 fathoms, fine gray sand will be brought up, and this in turn will be followed by a mixture of sand and mud.

TIDES and TIDAL STREAMS Nantucket shoals.—It is high water, full and change, at Siasconsett (south side of Nantucket island) at 11h. 33m. springs rise $2\frac{3}{4}$ feet, neaps 2 feet.

The ebb stream across Nantucket shoals begins a short time before the tide has ceased to rise by the shore, and runs in a direction a little eastward of south, with no interval of slack water. It then gradually attains its greatest velocity, in a direction between South and West, after which it slackens, altering its direction to a little westward of North. This is the commencement of the flood stream, which gradually attains its greatest velocity, changing its direction to between North, and East, or contrary to that of the ebb stream, after which it slackens and runs to the southward as before, thus completing an entire circuit in the direction of the hands of a watch. The flood and ebb streams, are of equal duration, each running about $6\frac{1}{2}$ hours, their minimum velocity being about one fourth of their maximum.

Near Great Rip, the ebb stream commences 10h. 30m. after the moon's meridian passage, the flood six hours later. Between Davis bank and Fishing Rip the same rule is observed, and at Nantucket New South shoal light vessel the ebb or westerly stream begins at 12 hours, and the flood at 18h. 30m. after moon's meridian passage.

North of Pollock Rip, the flood stream runs at the period of its greatest velocity, $N.E.$ by $E. \frac{1}{4} E.$ at the rate of three-quarters of a knot; the ebb $S.W. \frac{1}{8} W. 1\frac{1}{4}$ knots.

Between Mc Blair shoal and Rose and Crown, the flood runs $N.N.E. \frac{3}{4} E. 1\frac{1}{2}$ knots, and the ebb $S.W. \frac{5}{8} S. 1\frac{1}{2}$ knots. In channel east of Great

Rip, the flood runs N. by E. $\frac{1}{2}$ E., $2\frac{1}{4}$ knots and the ebb with the same velocity in an opposite direction. In channel east of Davis bank, the direction of the flood stream, is N.N.E. $\frac{1}{2}$ E., velocity $2\frac{1}{4}$ knots, and that of the ebb, S.W. by S. $2\frac{1}{4}$ knots. Over the south extreme of Davis bank, they run respectively N.N.E. $2\frac{1}{4}$, and S.S.W. 2 knots. On the western side of Fishing Rip, the flood stream runs N.E. by E. $\frac{1}{2}$ E., $3\frac{1}{2}$ knots, and the ebb, S.W. by W., $2\frac{1}{2}$ knots, while on the eastern side of the same shoals, the streams run respectively N.E. 4 knots, and S.W. $3\frac{1}{2}$ knots., being the greatest velocities observed about Nantucket shoals.

A vessel is not likely to be set on to any of the Nantucket shoals, by either flood, or ebb stream, unless within 9 miles of them.

Ice, even in severe winters, offers no serious obstruction to vessels passing east of Nantucket shoals.

NANTUCKET and **VINEYARD** **SOUNDS** separate the southern shore of cape Cod peninsula from Nantucket and Martha's Vineyard islands ; and through these waters pass the greater part of the coasting trade between Boston and New York.

Nantucket sound is the eastern portion, and is entered from the eastward between Monomoy point on the north and Great point on the south ; from the southward by Muskeget channel; and from the westward by the adjoining water of Vineyard sound, the common dividing points between which and Nantucket sound are cape Poge and Succoneset.

LIGHTS IN AND EASTWARD OF NANTUCKET SOUND.—**Chatham**.—On the main land, and on the west side of Chatham harbour are two circular white towers, North and South of each other, 43 feet high, and 33 yards apart. They each exhibit a *fixed* white light, 80 feet above high water, visible in clear weather 14 miles. An automatic whistling buoy, painted red, and giving blasts at shorts intervals, is moored in 6 fathoms, bearing E. $\frac{3}{4}$ N. from Chatham lighthouses, and N. by E. $\frac{1}{4}$ E. from Pollock Rip light vessel.

Monomoy Point.—On Monomoy beach, the southern extreme of cape Cod, is an iron tower, painted red 30 feet high, which exhibits, at 41 feet above high water, a *fixed* white light, visible 12 miles.

Bass River.—On the north side of Nantucket sound, and eastward of the entrance to Bass river, is exhibited a *fixed* white light, elevated 40 feet above high water, and visible 12 miles. The light is shewn from a lantern surmounting the keeper's two-storey house.

Bishop and Clerks.—On the north extreme of Bishop and Clerks ledge, is erected a gray granite tower, 47 feet high, from which is exhibited, at an elevation of 59 feet above high water, a *flashing* white light, shewing very *thirty seconds* a *white flash*, visible 13 miles.

Nantucket (Great Point).—On Great Point, the north-east extreme of Nantucket island, is a white tower, 60 feet high, which exhibits, at 70 feet above high water, a *fixed* white light, visible 14 miles, excepting between the bearings of N. by E. $\frac{1}{2}$ E. and N.W. by W.

Pollock Rip light vessel, painted red, schooner rigged, with *Pollock Rip* on her sides, lies with Nantucket (Great point) lighthouse bearing S.W. $\frac{1}{4}$ S. $10\frac{1}{2}$ miles, and Monomoy point N.W. by W. $\frac{1}{4}$ W. $3\frac{1}{8}$ miles, and exhibits, at 45 feet above high water, *two fixed red* lights, visible 12 miles.

Fog signal.—In foggy weather a siren is sounded, giving blasts of *five seconds* duration, followed by intervals of *fifty-five seconds*.

Shovelful shoals light vessel, with two masts, and painted green, with *Shovelful* on her sides, lies S. by W. $\frac{1}{4}$ W. distant $1\frac{1}{4}$ miles from Monomoy lighthouse, and exhibits, at 40 feet above high water, a *fixed red* light, visible 11 miles.

Fog signal.—In foggy weather a bell and horn are sounded.

Handkerchief light vessel is schooner-rigged, carries a black day mark at each masthead, and is painted straw colour, with *Handkerchief* on her sides. The vessel lies in 8 fathoms water, S. by E. $\frac{1}{8}$ E. $3\frac{3}{4}$ cables from the south end of Handkerchief shoal, with Shovelful light vessel bearing N.E. by E. $\frac{1}{2}$ E., and Great point lighthouse S. $\frac{1}{4}$ W. The vessel exhibits, at 40 feet above high water, a *fixed* white light, visible 11 miles.

Fog signal.—In foggy weather a horn and bell are sounded.

Cross Rip light vessel, painted black with a white streak, and with Cross Rip on each side, is schooner-rigged, with a white day mark at each masthead. She lies in 8 fathoms water, north of Cross Rip, and from an elevation of 39 feet above high water shows a *fixed* white light, visible 11 miles.

Fog signal.—A bell and horn are sounded in foggy weather.

Sankaty Head.—On Sankaty head, the south-east point of Nantucket island, is exhibited from a horizontally painted red and white tower, 65 feet high, a *fixed* white light varied by a *white flash of ten seconds* duration *every minute*. This light is elevated 150 feet above high water, and in clear weather should be seen 18 miles.

Nantucket New South shoals light vessel is moored in 14 fathoms water, about 3 miles S.S.E. from the shoalest part of Davis New South shoal. She exhibits two *fixed* white lights, each 44 feet above high water, and visible 12 miles. The vessel is schooner-rigged and painted red, with *Nantucket New South shoals No. 1* on her sides.

Fog signal.—In foggy weather a horn and bell are sounded.

DANGERS in the EASTERN ENTRANCE to NANTUCKET SOUND.*—**Pollock Rip** extends S.E. by E. $\frac{1}{2}$ E. $5\frac{1}{2}$ miles from Monomoy point lighthouse; the eastern and outer portion is

* See Admiralty chart:—Monomoy harbour, No. 2,489, scale, m = 1·8 inches.

known as Broken part of Pollock Rip, with 12 to 16 feet water on it, the south-east extreme of which is marked by a red can buoy moored in $5\frac{1}{2}$ fathoms; at $2\frac{1}{2}$ miles north-westward from this buoy and a little to the northward of a line joining it and Monomoy point lighthouse, is a second red nun buoy marking the south-east extreme of the central portion, named Main Part of Pollock Rip, with 10 to 18 feet water on it. This buoy lies in 19 feet water, and bears E. by S. $\frac{1}{2}$ S. $3\frac{1}{2}$ miles from Monomoy point lighthouse. Bearse shoal is the name given to the western and shoalest part of Pollock Rip. It has as little as 5 feet water on some parts, and its western extremity is marked by a black nun buoy. At $1\frac{3}{4}$ miles N. by E. $\frac{3}{4}$ E. from Pollock Rip light vessel, is placed a red nun buoy, marking the eastern extremity of a detached shoal of 15 feet, lying on the north-east side of Pollock Rip. Northward $1\frac{1}{2}$ miles from this shoal, and E. by N. $\frac{1}{4}$ N. $3\frac{1}{2}$ miles from Monomoy point lighthouse, is another bank with 17 feet water on it. A continuation of Bearse shoal to the south-west and round Monomoy point forms Shovelful shoal; it extends southward from the point about two-thirds of a mile. The south-east and south-west edges are marked with three red buoys. A small detached shoal* with 14 feet water on it lies E. by N. $\frac{3}{4}$ N. half a mile from Shovelful light vessel, and is marked by a red and black horizontally striped nun buoy, placed on its northern side.

Twelve-feet shoal, lying in an east and west direction, half a mile long, has 12 feet water over it; its eastern extreme is marked by a red and black horizontally striped nun buoy, bearing S.W. $\frac{1}{4}$ W. three-quarters of a mile from the buoy on the outer extremity of Broken Part of Pollock Rip, and S.E. $\frac{5}{8}$ E. $1\frac{1}{2}$ miles from Pollock Rip light vessel.

Broken Rip, with 10 feet water near its eastern extreme, is an extensive shoal, the centre of which is marked by a black nun buoy. Between this shoal and Twelve-feet shoal, there are depths of 14 to 16 feet.

Handkerchief shoal is a triangularly-shaped shoal, 4 miles long N.E. by N. and S.W. by S., and $1\frac{1}{2}$ miles broad at its widest part, with depths varying from 4 to 16 feet on it, having its longest side to the west, and its apex towards Monomoy point; this broad apex or eastern portion is marked with a black nun buoy, lying W. by S. $\frac{1}{4}$ S. $1\frac{1}{2}$ miles, and a red spar buoy S.W. $\frac{1}{2}$ W. $2\frac{1}{10}$ miles from Monomoy point lighthouse; leaving a channel between these buoys and Shovelful shoal over 3 cables broad, but which is not suitable for strangers. A black spar buoy bearing W. by N. $\frac{1}{4}$ N. 3 miles from Monomoy point lighthouse marks the north

* This shoal is extending in a northerly and southerly direction; vessel should pass half a cable south of Shovelful light vessel. *United States Hydrographic Notice, No. 51 of 1882.*

point of the shoal, and a red nun buoy the southern extreme bearing N. by W. $\frac{1}{4}$ W. 3 cables from Handkerchief light vessel.

Stone Horse, Little Round, and Great Round shoals are the names given respectively to the north-west, middle, and south-east portions of a very large bank, dividing Main or South from Butler's Hole channels. Stone Horse has from 9 to 11 feet over it, and is marked by a black nun buoy placed on its north-west side in $6\frac{1}{2}$ fathoms, bearing S. by W. $\frac{1}{8}$ W., $1\frac{1}{4}$ miles from Shovelful, and W. by S. $\frac{1}{4}$ S., $3\frac{3}{4}$ miles from Pollock Rip light vessels. Little Round shoal has $4\frac{1}{2}$ feet water over its shoalest part. The shallowest part of Great Round shoal, with 4 feet water over it, is situated S.E. by E. $\frac{1}{2}$ E., $7\frac{1}{2}$ miles from Handkerchief light vessel, and E. by N. $\frac{3}{4}$ N. the same distance from Nantucket lighthouse. A red spar buoy is placed in 20 feet water, S. by E. three-quarters of a mile from the shoalest part.

McBlair shoal consists of several detached shoals $2\frac{1}{2}$ miles long, in an east and west direction, with as little as 9 feet water (near the centre), which bears S. $\frac{3}{4}$ E., $8\frac{1}{2}$ miles from Broken part of Pollock Rip red buoy, S.E. $\frac{3}{4}$ E. $12\frac{1}{2}$ miles from Handkerchief light vessel, and E. $\frac{3}{4}$ S. $10\frac{1}{2}$ miles from Nantucket lighthouse.

Great Point Rip, with one to 6 feet water over it, extends E. by N. $\frac{1}{4}$ N., 3 miles from Great point, its termination being marked by a black spar buoy placed in 3 fathoms water, which bears N.E. by E. $\frac{3}{4}$ E. 3 miles from Nantucket lighthouse, and W. by S., $4\frac{1}{10}$ miles from Round shoal red buoy.

Directions.—Main or South channel.—This channel is commonly used by coasters of heavy draught, and those without local pilots, on account of its width, straightness, and regularity of the tidal streams. It passes between Great Round and McBlair shoals, and has not less than $5\frac{1}{4}$ fathoms at mean low water. With Pollock Rip light vessel bearing N.N.W. 8 miles, and Nantucket lighthouse W. $\frac{1}{8}$ S., $10\frac{1}{2}$ miles, with 11 fathoms water, steer W. by N. $\frac{1}{4}$ N. for Cross Rip light vessel, distant 21 miles, passing nearly a mile south of Great Round Shoal buoy, and the same distance north of Great Point Rip buoy. The course to Vineyard sound from Cross Rip light vessel, is W. by N. $\frac{5}{8}$ N.

By Butler's Hole.—Being in 10 or 12 fathoms water, bring Pollock Rip light vessel to bear W. by N. $\frac{1}{4}$ N., in line with Shovelful light vessel, and steer for them. Continue this course to the latter, whence a S.W. by W. $\frac{1}{2}$ W. course leads to Handkerchief light vessel. If proceeding to North channel, steer N.W. $\frac{1}{4}$ W. for its eastern entrance; if to Cross Rip light vessel, W. $\frac{3}{4}$ S. until the latter bears W. by N. $\frac{1}{4}$ N. The above courses pass close south of Broken part of Pollock Rip buoy, and over half a mile north of Twelve-feet shoal buoy. Pollock Rip light vessel may be passed on either side; pass half a cable south of Shovelful

light vessel, thence to Handkerchief light vessel, passing between Stone Horse shoal buoy and Handkerchief shoal.

To clear the north extreme of Stone Horse shoal, Pollock Rip light vessel must not be brought east of E. $\frac{3}{4}$ S. $4\frac{1}{2}$ fathoms can be carried through Butler's Hole.

By night, Chatham lights bearing N. by W. $\frac{1}{2}$ W. lead east of Broken Part of Pollock Rip. Monomoy light bearing N.W. by W. $\frac{1}{2}$ W. leads south of Pollock Rip.

Shovelful light vessel seen open eastward of Monomoy point lighthouse bearing N. by E. $\frac{1}{2}$ E. leads west of Stone Horse shoal.

Pollock Rip light vessel open southward of Monomoy lighthouse N.W. $\frac{3}{4}$ W. leads north of Twelve Feet shoal.

From the northward those locally acquainted frequently use a passage of $3\frac{1}{2}$ fathoms at mean low water, between Pollock Rip and Broken part of Pollock Rip by steering for Pollock Rip light vessel, bearing S.S.W. $\frac{1}{2}$ W., whence they steer as above directed.

DANGERS in NANTUCKET SOUND.—The Shoal Spots, with 12 feet least water, is the name given to an extensive bank, situated west of Monomoy island. The south-west edge is marked by a red spar buoy, moored in 3 fathoms, bearing N.E. $\frac{3}{4}$ N. $1\frac{1}{4}$ miles from Handkerchief shoal north buoy, and N.W. $2\frac{2}{3}$ miles from Monomoy point lighthouse.

Common Flats, with 12 to 15 feet water over them, extend north, and north-west, from the north extreme of Monomoy island, and are marked with two red spar buoys, bearing W. by S. $\frac{1}{2}$ S. $3\frac{1}{2}$, and S.W. by W. 4 miles from Chatham lighthouses, marked No. 2 and No. 4 respectively.

Harwich Flats, west of Chatham roads, extend $1\frac{3}{4}$ miles from the shore near Harwich port; 16 feet water being found at that distance.

Kill pond bar extends 2 miles from the shore between Herring and Bass rivers. It has from 4 to 8 feet water over it, and the outer extreme is marked by a red spar buoy, placed in 3 fathoms bearing E. by N. $\frac{1}{2}$ N. 7 miles from Bishop and Clerk lighthouse.

Bishop and Clerks shoal, a rocky ledge, with 4 feet least water over it, surrounds the lighthouse of that name; its southern extremity is marked by a red spar moored in $3\frac{1}{2}$ fathoms, bearing S. $\frac{1}{2}$ E. nine-tenths of a mile from Bishop and Clerks lighthouse.

Senator shoal, with 7 feet least water, lies S.E. by S. from Gammon point, distant one mile. This shoal spot is marked by a red spar buoy placed in 16 feet water near its south-eastern side.

Several shoal patches, with 12 to 17 feet water over them, lie between Senator, and Bishop and Clerk shoals, but as this channel is only used by vessels drawing less than 12 feet, they are not regarded.

Hallet rock with 8 feet water over it, is marked by a spar buoy painted red and black in horizontal stripes, bearing from Bishop and Clerks lighthouse N. by W. $\frac{1}{2}$ W. distant $1\frac{1}{10}$ miles.

Hyannis Middle ground, with 12 feet water, situated W. by N. $1\frac{1}{2}$ miles from Bishop and Clerks lighthouse, is marked by a red and black horizontally striped buoy placed W. by N. $\frac{1}{2}$ N. 2 miles from Bishop and Clerks lighthouse.

West-south-west ledge or Gangway rock, with 8 feet water on it, lies W. by S. $\frac{3}{4}$ S. from Gammon point, distant $2\frac{1}{3}$ miles, and is marked by a bell buoy, placed south-east of the rock in 17 feet water, bearing S.S.W. $\frac{1}{4}$ W. $2\frac{3}{4}$ miles from Hyannis lighthouse, and N.W. by W. $2\frac{6}{10}$ miles from Bishop and Clerks lighthouse.

In winter this buoy is replaced by a red spar buoy.

Succonnesset, is a shoal lying off the main land. Its south-east angle is marked by a light vessel.

Wreck shoal, with 10 feet water is marked with a red spar buoy, placed a quarter of a mile south of the shoalest part, bearing E. by N. half a mile from Succonnesset light vessel.

Eldridge shoal, with 6 feet least water on it, is situated on the south side of North channel. A black spar buoy is placed 2 cables north of the rock, bearing S.E. by E. $\frac{3}{8}$ E. distant nearly a mile from the same.

Small Shoal, with 9 feet water upon it, is marked by a black and red horizontally striped buoy, bearing W. $\frac{1}{4}$ S., $1\frac{4}{10}$ miles, from Succonnesset light vessel. Vessels should pass north of this buoy.

A shoal on the north side of the channel, with 10 feet least water ; bears E. by N. $\frac{1}{2}$ N. nearly 3 miles distant from Succonnesset light vessel.

Horse Shoe is an extensive shoal, situated between Cross Rip light vessel, Succonnesset light vessel, and Bishop and Clerks lighthouse. It is composed of hard sand, dry at low water in some places, and its most projecting points are marked with the following four buoys. Broken ground black spar buoy, in 3 fathoms, near the north-east extreme, bearing S.W. by W. $\frac{1}{3}$ W., 3 miles from Bishop and Clerks lighthouse.

No. 9 ; a black spar buoy, placed in 4 fathoms near the north-west extreme, bearing from Succonnesset light vessel E. by S., 2 miles distant.

No. 12, a red nun buoy, near the south-east extreme, which bears E. $\frac{1}{3}$ S. $2\frac{4}{10}$ miles distant from Cross Rip light vessel.

No. 14, a red nun buoy on the south-west side, bearing N.W. $\frac{1}{4}$ W. nearly 4 miles from Cross Rip light vessel.

Cross Rip, with 11 feet water, lies southward of the light vessel of the same name; its northern extremity being marked by a black spar buoy placed in 3 fathoms, which bears from Cross Rip light vessel S.W. $\frac{1}{4}$ W. distant 4 cables.

Hawes and Norton shoals are the names given to the west, and east portions, respectively, of an extensive bank, forming the westernmost of a succession of detached shoals, lying between cape Poge and Great point. It has depths varying from 4 to 16 feet, and is marked by three buoys, placed as follows:—

Norton shoal buoy, black and nun shaped, on the south side of main or south channel, bearing W. by S. $\frac{1}{2}$ S. 3 miles from Cross Rip light vessel.

No. 13, A black spar buoy, on the north-west extreme of Hawes shoal, bearing E $\frac{1}{4}$ N., 1 $\frac{6}{10}$ miles, from cape Poge lighthouse.

No. 4, a red spar buoy, for the convenience of those using Muskeget channel, near the south-west extremity of Hawes shoal S. by E. $\frac{7}{8}$ E., 2 $\frac{6}{10}$ miles, from cape Poge lighthouse.

Long shoal, with 2 feet least water, lies south of Norton shoal; its north-east extremity being marked by a red spar buoy, bearing S.W. $\frac{3}{8}$ W., distant 2 $\frac{3}{4}$ miles, from Cross Rip light vessel.

Edwards shoal, has 10 feet on its shallowest part, which bears S. by W., 2 miles distant from Cross Rip light vessel.

Tuckernuck shoal, 5 miles long in an E.N.E. and W.S.W. direction, has depths varying from 4 to 10 feet. Its east extreme is marked by a black nun buoy, which bears S.W. by W., 7 $\frac{6}{10}$ miles from Handkerchief light vessel, W. by N. $\frac{5}{8}$ N. 6 $\frac{1}{2}$ miles from Nantucket (Great point) lighthouse, and S.E. $\frac{1}{4}$ E. 5 $\frac{4}{10}$ miles from Cross Rip light vessel.

Directions.—From Handkerchief light vessel north of Horse Shoe Shoal.—The course from Handkerchief light vessel to the entrance of north channel is N.W. $\frac{1}{4}$ W.; as soon as Bishop and Clerks south buoy is visible, bearing W. by N. $\frac{1}{2}$ N., steer W. by N. to pass between the latter, and Horse Shoe shoal, in not less than 4 $\frac{3}{4}$ fathoms. When Succonnesset light vessel bears W. $\frac{3}{4}$ S., alter course to W. by S. $\frac{3}{4}$ S. to pass between her and Eldridge shoal buoy.

If wishing to continue in north channel, as soon as Succonnesset light vessel bears W. by N. $\frac{3}{4}$ N., steer W. $\frac{3}{4}$ N., passing north of Small shoal buoy and L'homme Dieu shoal; or the W. by S. $\frac{3}{4}$ S. course may be continued until cape Poge lighthouse bears S. $\frac{3}{4}$ E., when a W. by N. $\frac{1}{2}$ N. course will lead through middle channel.

If proceeding north of Bishop and Clerks lighthouse, continue the N.W. $\frac{1}{4}$ W. course, until it bears S.S.E. $\frac{1}{4}$ E., and Hyannis lighthouse

N. $\frac{1}{3}$ W., with $5\frac{1}{4}$ fathoms depth of water; when steer W. by S. $\frac{3}{4}$ S. and proceed as before directed.

To clear the north side of Horse Shoe shoal, Succonnesset light vessel should not be brought to bear north of West, nor south of W. by S. $\frac{1}{3}$ S., to clear the shoal not buoyed, on the opposite of the channel.

ANCHORAGES in Nantucket sound.—CHATHAM ROADS is a good anchorage in north or easterly gales, in proceeding to which, from Handkerchief light vessel, steer N.N.W. $\frac{1}{4}$ W. until Monomoy point lighthouse bears N.E. by E. $\frac{1}{4}$ E., when alter course to N. by E. $\frac{1}{2}$ E. As soon as Handkerchief north buoy is abeam, bearing E. by S. $\frac{1}{2}$ S., steer N.E. by N. $\frac{1}{4}$ N. to the entrance to Chatham roads. When Chatham lighthouses bear E. by N. $\frac{1}{8}$ N. steer for them and anchor in $2\frac{1}{2}$ to 4 fathoms.

These courses with not less than $3\frac{1}{2}$ fathoms, pass a quarter of a mile westward of Handkerchief north buoy; three-quarters of a mile west of Shoal Spots buoy, and 4 cables north-west of the northern common flats buoy (marked No. 2).

LIGHT.—Stage harbour.—On Harding beach is erected an iron tower painted red, which from an elevation above high water, of 45 feet, exhibits a *fixed* white light, visible seaward 12 miles.

Only 4 feet at mean low water can be carried over the bar into stage harbour.

HYANNIS ROADS.—This anchorage, frequently resorted to by coasters, for shelter during north-easterly gales, is situated north-west of Gammon point, and south-west of the entrance to Lewis bay.

The anchorage is partly sheltered from southerly winds by a stone breakwater 400 yards long, the east extreme of which bears S.S.W. distant three quarters of a mile from Hyannis lighthouse.

LIGHT.—Hyannis tower situated on the mainland N. $\frac{1}{2}$ E. from the east extreme of the breakwater, is coloured white, 21 feet high, and exhibits, at 42 feet above high water, a *fixed red* light, visible 11 miles when bearing between N. by W. $\frac{1}{2}$ W. and E. by N. $\frac{3}{4}$ N.

DANGERS.—South-west Ground, with 7 feet water on it, is marked with a black spar buoy, placed in 3 fathoms east of the rock, which bears S.S.W. distant 2 miles from Hyannis lighthouse, in line with the east extreme of the breakwater, and W. $\frac{3}{4}$ S. from Gammon point tower distant $1\frac{1}{2}$ miles.

Gallatin rock with 5 feet water over it, has a black spar buoy placed on its west side, which bears N.W. by W. $\frac{1}{4}$ W. distant 4 miles from Bishop and Clerks lighthouse.

Great rock, dry at low water, is situated three-quarters of a mile from the east shore, and has erected upon it a beacon, surmounted by a cage, bearing S. $\frac{1}{2}$ W. $1\frac{1}{10}$ miles from Hyannis lighthouse.

Gardiner rock, with 10 feet water, lies $1\frac{1}{4}$ cables southward of Great rock beacon, and is marked by a red spar buoy, placed on its south-western side.

Half-tide rock dry at half ebb lies N.W. $\frac{3}{4}$ W. from Gammon point, distant three quarters of a mile, and S.E. from Great rock beacons distant a quarter of a mile.

Directions.—From the eastward continue the N.W. $\frac{1}{2}$ W. course before mentioned, through the east entrance of north channel, until Hyannis lighthouse bears N. by E. $\frac{1}{4}$ E., and south-west ground black buoy is about 4 cables distant, carrying $3\frac{1}{4}$ fathoms. Thence steer for Hyannis lighthouse, carrying not less than 16 feet and anchor north of the breakwater in 2 to 3 fathoms, mud.

From the westward.—Steer E. by N. $\frac{3}{4}$ N. until east of West-south-west ledge bell buoy, and Hyannis lighthouse bears N. by E. $\frac{1}{4}$ E. ; when proceed as before directed.

Working up to the Roads.—When abreast South-west ground do not approach nearer than into $2\frac{1}{2}$ fathoms water to either shore. When northward of Great rock, the mark to keep west of the shoals on the eastern side is Hyannis lighthouse on with West spire in the village ; when northward of South-west ground, the mark to keep east of the shoal water on the western side, is the west end of the breakwater in line with Hyannis lighthouse.

In North channel during thick weather a depth of 10 and 11 fathoms is a sure indication of being northward of Horse Shoe shoal.

Nantucket harbour is almost entirely land-locked, being divided from the sea by a beach. The town of Nantucket, situated on the western shore of the harbour, was formerly a place of considerable importance, owing to the number of vessels that fitted out for the whale fisheries. This branch of industry having failed, and moreover the entrance to the harbour being closed to all vessels but those of the lightest draught, the harbour is never resorted to by strangers ; but in southerly gales shelter may be obtained outside the bar in 4 to 7 fathoms, good holding ground.

LIGHTS.—Brant Point.—On Brant point, the west entrance point of Nantucket harbour is built a red brick tower, 42 feet high, from which is exhibited a *fixed* white light, at an elevation of 46 feet above high water, and visible seaward 12 miles.

Nantucket Cliff range beacons.—On the beach north-west of the town of Nantucket, are two small pyramidal wooden structures, 100 yards N.N.E. $\frac{3}{4}$ E. and S.S.W. $\frac{3}{4}$ W. from each other. A *fixed* white light is exhibited from the northern, and a *fixed red* light from the southern beacon, elevated respectively 8 and 10 feet above high water, and visible 7 miles.

Anchorage.—There is good anchorage south-west of Great point the north-east extreme of Nantucket island with easterly winds in 7 to 8 fathoms water.

MUSKEGET CHANNEL,* between Chappaquiddick, and Muskeget islands, and much nearer the former than the latter, is a fair wind, day channel. Although 21 feet water can be carried through at mean low water, this channel is rarely used on account of its dangerous shoals and conflicting currents.

DANGERS.—**Wasque shoal** on the west side, extends in a general direction of S.W. $\frac{1}{2}$ W. $3\frac{1}{2}$ miles from Skiff island, a small low island lying S.S.E. $1\frac{1}{10}$ miles from Wasque bluff (the south point of Chappaquiddick island). It has from 3 to 17 feet water on it, the shoalest water being found on the southern portion of the eastern part. The southern extremity with 16 feet water, bears S.S.W. $\frac{3}{4}$ W. 4 miles from Wasque bluff. The eastern shore of Chappaquiddick, is bordered by flats extending from a quarter to three quarters of a mile from it, and vessels should be careful to use the lead, and not shoal to less than $3\frac{1}{4}$ fathoms.

Tom shoal, with 6 feet on it, is situated on the eastern edge of one of these flats, and is marked by a black spar buoy, in 3 fathoms, bearing from cape Poge lighthouse, S $\frac{1}{2}$ E. distant $2\frac{6}{10}$ miles. A black spar buoy situated N.N.E. $\frac{3}{4}$ E., three-quarters of a mile from cape Poge lighthouse, marks the northern edge of cape Poge flats.

On the east side of the channel are several shoals: the most outlying shoal has 14 to 18 feet water over it, extending $2\frac{1}{2}$ miles in a north-east and south-west direction, the western extreme of which (a detached spot with 3 fathoms), bears S. $\frac{1}{2}$ E. distant 5 miles from Wasque bluff.

Mutton shoal, with 6 to 12 feet water, is the name given to the western extreme of a large shoal $3\frac{1}{4}$ miles long in an E.N.E. and W.S.W. direction. It is marked by a red spar buoy, placed in 20 feet water, which bears south distant $5\frac{3}{4}$ miles from cape Poge lighthouse.

Directions.—**From the eastward**, cape Poge lighthouse should be brought to bear North, distant 10 miles, and steered for until up

* See Admiralty plan :—Muskeget channel, No. 2,456; scale, $m = 1 \cdot 2$ inches.

with Mutton shoal buoy. Pass west of the latter, and steer N. $\frac{1}{2}$ E. for a mile, or until Wasque bluff bears N.W. $\frac{1}{2}$ W., and cape Poge lighthouse N. $\frac{1}{2}$ W., carrying not less than $3\frac{1}{2}$ fathoms. The course is now N. by E. into Nantucket sound, with not less than $3\frac{1}{2}$ fathoms.

From the westward, cape Poge lighthouse should be brought to bear N. by E. distant $11\frac{1}{2}$ miles with a depth of 17 fathoms, whence steer N.N.E. $\frac{1}{2}$ E. for Mutton shoal buoy, carrying not less than $4\frac{1}{2}$ fathoms. From this buoy follow the directions given above.

VINEYARD SOUND is entered from the westward between Cuttyhunk island, the westernmost of the Elizabeth group, and Gay head the west extreme of Martha Vineyard island. As before stated its eastern portion joins the western waters of Nantucket sound on the line joining Succonnesset point and cape Poge.

It contains several good harbours, the principal of which are Wood Hole and Tarpauline cove on the north, and Edgartown harbour and Vineyard haven (formerly called Holmes Hole) on the south shore.

LIGHTS IN VINEYARD SOUND.—Gay head.—On Gay head, the west extreme of Martha Vineyard island, is built a tower of red brick, 41 feet high from the base to centre of lantern, which exhibits, at 170 feet above high water, a *flashing red* and white light. The interval between the flashes is *ten seconds* and *every fourth* flash is *red*, visible from a distance of 19 miles.

Holmes Hole (West Chop).—At West Chop, the north point of Martha Vineyard island and west entrance point of Vineyard Haven, from a white tower 36 feet high, is exhibited a *fixed* white light, at 69 feet above high water, which should be seen 13 miles. This light is not visible from the westward when bearing east of E. by S. $\frac{1}{2}$ S.

Fog signal.—In foggy weather a steam whistle is sounded, giving blasts of *three seconds* duration, followed by intervals of *twenty-seven seconds*.

East Chop.—On the north extreme of the east entrance point of Vineyard haven is erected a white tower, 24 feet high, which shows from an elevation of 79 feet above high water a *fixed red* light visible 14 miles. From the eastward this light is obscured when bearing north of W.N.W.

Cape Poge.—On cape Poge the north point of Chappaquiddick island, from a white tower 36 feet high, is exhibited a *fixed* white light at 57 feet above high water, and visible 13 miles.

Vineyard sound light vessel (Sow and Pigs), moored in $13\frac{1}{2}$ fathoms water, south-west of Sow and Pigs rocks, exhibits *two fixed* white lights at 34 feet above high water, which should be seen 10 miles. The vessel is painted red, with *Vineyard sound* on her sides.

Fog signal.—In foggy weather a siren is sounded, giving blasts of *six seconds duration* followed by intervals of *forty-five seconds*.

Cuttyhunk.—On the south-west point of Cuttyhunk island, the south-east entrance point of Buzzard bay, a *fixed* white light, 42 feet above high water, is exhibited from a white tower 32 feet high, and visible 12 miles. In Vineyard sound this light is obscured when bearing west of N.N.W. $\frac{1}{2}$ W.

Tarpaulin cove.—On the west side of Tarpaulin cove, Naushon island, is a white tower 32 feet high, and exhibits at 80 feet above high water, a *fixed* white light, varied by a *white flash every half minute*, visible 14 miles.

Nobska point.—On Nobska point, the eastern entrance point of Wood Hole is erected a red tower, 35 feet high from the base to centre of lantern, which exhibits, at 89 feet above high water, a *fixed* white light, visible seaward 13 miles.

Fog signal.—During foggy weather, a bell is sounded, giving *two strokes* in quick succession, followed by a single stroke, after an interval of *thirty seconds*.

Succonnesset shoal light vessel, schooner rigged, and painted straw colour, with *Succonnesset* on each side, lies in 6 fathoms water, $1\frac{1}{2}$ cables south-west of the west extreme of Wreck shoal, and exhibits, at 40 feet above high water, a *fixed* white light, visible 11 miles.

Fog signal.—A bell and horn are sounded in foggy weather.

DANGERS in Vineyard sound.—**Sow and Pigs reef**, composed of boulders, many of which are above high water, extends from the south-west point of Cuttyhunk island in a W.S.W. direction for $1\frac{4}{10}$ miles. A red can buoy is placed on its western extremity bearing W.S.W. $1\frac{1}{2}$ miles distant from Cuttyhunk lighthouse and N.E. $\frac{5}{8}$ N., one mile from Vineyard sound light vessel. From the south-west point of Cuttyhunk island to Nobska point lighthouse there are no off-lying dangers, and the general direction to keep half a mile from the north-west shore of Vineyard sound, would suffice to take a ship through as far as the latter.

Davis Neck shoal is the name given to the most projecting portion of a bank, extending with an average distance of half a mile from the coast between Nobska point and Succonnesset shoal. Davis Neck shoal lies south of Davis Neck, on the east side of Falmouth harbour, has 7 to 9 feet over it, and is marked by a red spar buoy placed in 3 fathoms, bearing E. $\frac{3}{4}$ N., distant $3\frac{4}{10}$ miles from Nobska point lighthouse.

L'Homme Dieu shoal, with 3 to 6 feet water, is narrow, and extends in an E. by S. $\frac{1}{2}$ S. and W. by N. $\frac{1}{2}$ N. direction $4\frac{1}{2}$ miles, both extremes being marked by black spar buoys. The eastern buoy bears W. by S. $\frac{7}{8}$ S., distant $2\frac{1}{2}$ miles from Succonnesset light vessel, and the western one N.E. $\frac{1}{4}$ N. $2\frac{1}{2}$ miles from Holmes Hole lighthouse.

A shoal, with 14 feet water over it, lies S.W. by W. distant half a mile from L'Homme Dieu shoal west buoy, and E. by S. from Nobska point light.

The Hedge Fence, $1\frac{1}{3}$ miles south of the above shoal, and similar to it in shape, has from 5 to 6 feet on it at low water, each extreme being marked by a red and black horizontally striped buoy, bearing respectively N. by W. $\frac{3}{8}$ W. 4 miles, and N.W. $\frac{1}{4}$ N. nearly 7 miles from cape Poge lighthouse.

At Night, when in Main or South channel, Nobska point light should not be brought to bear west of N.W. by W. $\frac{1}{2}$ W., to clear the south side of the Hedge Fence, which is steep to.

Squash Meadow shoal, with 10 feet water over it, is situated on the south side of Main or South channel. Between the depths of 3 fathoms, it is $1\frac{1}{2}$ miles long N.W. by W. and S.E. by E., with an average width of $1\frac{1}{2}$ cables. The eastern extreme is marked with a black can buoy, bearing S.E. by E. $\frac{1}{2}$ E., distant $2\frac{3}{4}$ miles from East Chop lighthouse. A black nun buoy is placed in 4 fathoms, west of the north-west extreme bearing N.W. by W. $\frac{3}{4}$ W. $1\frac{4}{5}$ miles from the same.

The Middle Ground, a long and very narrow shoal, extends in an E. by N. and W. by S. direction $4\frac{1}{2}$ miles. Its eastern extreme bears N.W. half a mile distant from Holmes Hole lighthouse, and is marked by a can buoy, painted red and black in horizontal stripes. A nun buoy similarly coloured, is placed near the western extreme, in $3\frac{1}{4}$ fathoms, bearing S.W. $\frac{1}{2}$ S. distant 4 miles from Nobska point light. The eastern portion of this bank is the shoalest, there being as little as 2 feet in that locality; the central part has from 6 to 10 feet, and the western, from 9 to 14 feet water over it, with the exception of a 3 fathom channel, situated about three-quarters of a mile from the western extreme.

Lucas shoal, with 14 feet water over it, is a quarter of a mile long in an E. by N. $\frac{1}{2}$ N. and W. by S. $\frac{1}{2}$ S. direction. The centre of the shoalest water bears S. $\frac{3}{4}$ E., distant $2\frac{1}{2}$ miles from Tarpaulin cove lighthouse. A can buoy, painted red and black in horizontal stripes, is placed near this position. A small patch, with 3 fathoms on it, lies S.W. by W. $\frac{3}{4}$ W., distant one mile from Lucas shoal buoy, and S. by W. 3 miles from Tarpaulin cove light.

The Devil's Bridge, a large portion of which dries at low water, extends in a north-westerly direction, 6 cables from Gay head, and is marked by a black nun buoy, in 5 fathoms water, placed near the north-western extremity of the reef.

Directions.—Through Vineyard sound, by Main or South channel.—With Vineyard sound light vessel bearing N.W. $\frac{3}{4}$ W., distant 2 miles, the course is E. by N. $\frac{5}{8}$ N., passing north of Lucas shoal, and The Middle Ground, until Nobska point lighthouse bears N.W. by W. Keep this lighthouse astern on this bearing, steering S.E. by E. between the Hedge Fence and Squash Meadow shoal, until cape Poge lighthouse bears S.E. by S., when the course is E. by S. $\frac{5}{8}$ S., for Cross Rip light vessel.

If proceeding by Middle channel between the Hedge Fence and L'Homme Dieu shoal; continue the E. by N. $\frac{5}{8}$ N. course from the entrance of Vineyard sound, until Holmes Hole lighthouse bears S. $\frac{1}{4}$ E., when steer E. by S. $\frac{1}{2}$ S. to abreast the buoys on the east extremes of L'Homme Dieu shoal and the Hedge Fence, and cape Poge lighthouse bears S. $\frac{3}{4}$ E. The course is now S.E. by E. $\frac{1}{4}$ E. for Cross Rip light vessel. In this channel the least water on the above courses is 4 fathoms.

If taking North channel, continue the E. by N. $\frac{5}{8}$ N. course, until just past Davis Neck buoy, and L'Homme Dieu shoal western buoy, and Holmes Hole lighthouse is in line with the latter bearing S.W. $\frac{3}{4}$ S. Now steer E. $\frac{3}{4}$ S. and follow the general directions for Nantucket sound.

On the above courses for this channel the least water is 5 fathoms.

Caution.—At Vineyard sound light vessel the flood stream runs eastward, and the ebb westward, with a velocity of one to 5 miles an hour. Too much attention cannot be given to this, in going through Vineyard sound at night.

Anchorages.—In strong southerly and easterly winds vessels may find temporary anchorage on the south-east side of Vineyard sound in Menemsha bight in 7 fathoms water, near Clark's spring, where good water can be obtained in abundance; and in Lumbard cove situated 4 miles westward of West Chop, in from 3 to 5 fathoms good holding ground.

With strong north-west winds, shelter may be obtained under Elizabeth islands, in 14 to 10 fathoms water.

QUICK HOLE, is a well buoyed channel with 5 to 8 fathoms water, leading from Vineyard sound to good anchorage and shelter in southerly winds, under the shores of Nashawena and Pasque islands, between which it passes.

DANGERS.—**Nashawena Flats**, extend a quarter of a mile from the south-east extreme of Nashawena island, and are marked by a black spar buoy, in 3 fathoms, bearing N. $\frac{1}{2}$ E., 4 $\frac{1}{2}$ miles distant from Gay head lighthouse.

Quick Hole ledge, a shallow reef, some parts of which are awash at low water, extends 3 $\frac{1}{2}$ cables from the western extreme of Pasque island. Its most outlying part, is marked by a red nun buoy, placed in 2 $\frac{1}{2}$ fathoms.

Lone rock, with 3 feet water, is situated N. by E. $\frac{1}{2}$ E. three-quarters of a mile, from the north-east point of Nashawena island, and between them there is from 5 to 8 fathoms water. A red and black horizontally striped buoy, is placed in 5 fathoms near its southern side.

Directions.—On the main course E. by N. $\frac{1}{2}$ N. through Vineyard sound, when Gay head light bears S. by W. $\frac{3}{4}$ W., Quick Hole will be open, and N.W. $\frac{1}{2}$ N. will lead safely in, until abreast Quick Hole ledge buoy, and Gay head light bears S. $\frac{1}{2}$ W. open a little east of the south-east extreme of Nashawena island. Keep this mark on, steering N. $\frac{1}{2}$ E., and passing 2 cables east of Lone rock.

TARPAULIN COVE.*—This excellent harbour of refuge for vessels of moderate draught, is situated in the middle of the south coast of Naushon island. It is however open to the eastward, and vessels should in preference, in easterly gales, either endeavour to make Wood Hole, or pass through Quick Hole into Buzzard bay.

DANGERS.—**Cove rock**, with 5 feet water, bears E. by N. $\frac{1}{4}$ N., distant 2 cables from Tarpaulin cove lighthouse, and is marked by a black spar buoy, placed on its eastern side, in 16 feet.

Single rock, detached, with 6 feet water over it, and about 1 $\frac{1}{4}$ cables from the west shore of the cove, is marked by a red and black horizontally striped buoy, which bears N. $\frac{7}{8}$ E., 4 cables, from Tarpaulin cove lighthouse.

A rock with 3 feet water over it, is situated one cable from the north shore, and bears N.N.E. $\frac{5}{8}$ E., distant half a mile, from Tarpaulin cove lighthouse.

Directions.—Continue the main channel course, until Tarpaulin cove lighthouse bears W. $\frac{1}{2}$ N., when proceed W. by N. into the cove, and anchor as convenient in 2 to 3 fathoms.

Large vessels should anchor in 5 to 5 $\frac{1}{2}$ fathoms, with Gay head light open east of Tarpaulin cove lighthouse point.

Wood Hole, is the name given to the somewhat crooked channel, with 16 feet water, separating Nonamesset (the eastern island of the

* See Admiralty plan:—Tarpaulin cove, on chart, No. 2,890.

Elizabeth group), from Nobska point, the south-western extreme of Cape Cod peninsula.

GREAT HARBOUR, affording shelter from all winds, in 4 to 10 fathoms water, is situated on the north-east side of Wood, Hole.

DANGERS.—Nonamesset point buoy, black and spar shaped, marks the south-east extreme of the shoal water, extending a quarter of a mile from the east point of Nonamesset point. It bears W. by S. $\frac{1}{2}$ S. three-quarters of a mile from Nobska point lighthouse.

Red ledge, awash at low water, has its south extreme marked with a red spar buoy, bearing N.E. distant 2 cables from Minkpoint

Grassy island ledge, with 5 feet water, is marked by a black spar buoy in 16 feet, placed on its northern edge, and bearing N. $\frac{3}{4}$ E. three-quarters of a cable from Grassy island.

Railway ledge, with 3 to 12 feet water, is situated on the north-east side of the harbour, its south-west extreme being marked by a red spar buoy, placed in 12 feet, and bearing N.N.E. $\frac{3}{4}$ E., one cable, from Grassy island ledge buoy.

Parker Flats, with 5 feet water, extend three-quarters of a cable westward from the bluff land of Parker Neck. A red spar buoy is placed in 18 feet water, which bears S. by E. $\frac{1}{2}$ E., a quarter of a mile distant from Railway ledge buoy.

Great ledge, parts of which dry at low water, extends 4 cables in a southerly direction from the south extreme of Parker Neck. A red spar buoy, is placed on the south-west edge of the ledge, in 3 fathoms, bearing W. by S. $\frac{1}{2}$ S., $6\frac{1}{4}$ cables from Nobska point lighthouse and E. by N. $\frac{1}{2}$ N. distant one cable from Nonamesset point buoy.

Directions.—Continue the main course E. by N. $\frac{5}{8}$ N. through Vineyard sound, until Nobska point lighthouse bears N.E. $\frac{1}{2}$ E. Proceed for the lighthouse on this bearing, and when seven-eights of a mile distant from it, and the depth of water is 7 fathoms, steer N. $\frac{1}{4}$ W., midway between Nonamesset point black buoy and Great ledge red buoy. Continue this course passing west of Parker Flats red buoy, carrying not less than 15 feet water, and anchor off Bar Neck wharf.

If intending to anchor in the north-western part of Great harbour, keep the N. $\frac{1}{4}$ W. course until Wood Hole bluff is in line with the south end of Bar neck wharf, when alter course to N.W., carrying not less than $3\frac{1}{2}$ fathoms, and anchor as convenient in 2 to 6 fathoms.

VINEYARD HAVEN or **HOLMES HOLE**,* the entrance points of which are East and West Chops, is a deep indentation on the north side of Martha Vineyard island, affording shelter from southerly and westerly winds, in 3 to 5 fathoms water, over good holding ground. In north and north-easterly winds, the anchorage is uncomfortable, notwithstanding which it is much resorted to in thick or heavy weather.

DANGERS.—**East Chop Flats** with 9 to 11 feet water on them, extend a quarter of a mile from East Chop, and are marked by a black spar buoy, placed in 3 fathoms, on the north-east side, bearing E. $\frac{1}{2}$ S. nearly half a mile distant from the northern extreme of East Chop.

Low point Flats parts of which are awash at low water extend $1\frac{1}{2}$ cables eastward from Low point, and are marked by a red spar buoy placed in 3 fathoms east of the shoal, and bearing E. $\frac{3}{4}$ S. $3\frac{1}{4}$ cables from Holmes Hole lighthouse. This shore should not be approached nearer than a quarter of a mile.

Harbour Flats with 3 to 8 feet water over them, extend a quarter of a mile from Holmes Hole village situated on the western shore. The eastern side is marked by a red spar buoy placed in 13 feet water, bearing S. $\frac{5}{8}$ W. distant $6\frac{1}{2}$ cables from Hudson Head wharf.

Canal Flats with 2 to 4 feet water on them, extend from the eastern shore $1\frac{1}{2}$ cables, being marked by a black spar buoy, moored in 12 feet, on the north-west side, which bears S.S.E. $\frac{3}{4}$ E. distant half a mile from Hudson Head wharf.

Directions. — From the westward.— When on the E. by N. $\frac{5}{8}$ N. course through Vineyard sound, and Holmes Hole lighthouse bears S.S.E., steer S.E. $\frac{1}{2}$ S. until the same lighthouse bears W. by S. $\frac{1}{4}$ S. 6 cables distant; when the course will be S. by W. into the harbour. A vessel may anchor anywhere on this course when past Hudson Head wharf, in $3\frac{1}{2}$ fathoms or less water.

In working, the lead will be found of great assistance when approaching either shore.

EDGARTOWN HARBOUR* is contained between the eastern extreme of Martha Vineyard island and Chappaquidick island.

LIGHT.—**Edgartown.**—The lighthouse rises from the keeper's dwelling situated on a pier, on the north side of Edgartown harbour. It is coloured white, 22 feet high, and exhibits at 36 feet above high water, a *fixed* white light, visible 11 miles, except between the bearings of N. by E. and N.E. by E.

* See Admiralty plan:—Vineyard haven, and Edgartown harbour, on chart, No. 2,890

DANGERS.—Outer Flats is the name given to the northern portion of a mass of ledges and shoals, extending about N.N.E., 2 miles from Starbuck point; and forming a natural breakwater to, and on the west side of Edgartown Outer harbour. Outer Flats have 8 feet water over them and are marked with a black can buoy, placed in 3 fathoms, a little north-east of the shoalest part, bearing W. by N., distant $2\frac{1}{2}$ miles, from Cape Poge Flats buoy. Between Outer Flats buoy and Edgartown are placed five red spar buoys and a red beacon marking the eastern edge of the shoal water on the western side of Edgartown harbour.

Lighthouse Flats with 9 to 11 feet water on them, are marked by the southernmost of these buoys, which is placed in 16 feet water, and bears S.E. by E. $\frac{3}{4}$ E., a quarter of a mile from Edgartown lighthouse.

Sturgeon Flats on the eastern side of the harbour have 8 to 10 feet water on them, and extend from the cliffs near North Neck. A black spar buoy is placed in 3 fathoms $1\frac{1}{4}$ cable north of the outer extreme, bearing E. $\frac{3}{4}$ N. nearly a mile from Edgartown lighthouse.

Stony-point Flats with 10 to 12 feet water on them, extend $2\frac{1}{4}$ cables north westward from Stony-point, and are marked by a black spar buoy, placed in 3 fathoms, on the western side, bearing N.E. $\frac{1}{4}$ E., $2\frac{1}{4}$ miles from Edgartown lighthouse.

Cape Poge Flats is the name given to the shoal water surrounding the cape; the northern extreme being marked by a black spar buoy placed in 18 feet water, which bears N.N.E. $\frac{7}{8}$ E., three quarters of a mile distant from cape Poge lighthouse.

Directions.—From the eastward.—On the course for Main or South channel of W. by N. $\frac{5}{8}$ N. from Cross Rip light vessel, when cape Poge lighthouse bears S.W. $\frac{1}{4}$ S., steer S.W. by W. $\frac{1}{2}$ W. for the entrance of the harbour. When cape Poge lighthouse bears S.E. by E. $\frac{3}{8}$ E., alter course to S.W. by S., which will lead safely into Outer harbour and up to the red buoy on Lighthouse Flats. After passing the line of this buoy and Edgartown lighthouse in one; as soon as the latter bears N.W. by W. $\frac{1}{4}$ W., steer W. by N. $\frac{1}{8}$ N. for the upper wharf in the village. This course will carry not less than 15 feet at low water, and good anchorage will be found anywhere between Lighthouse Flats buoy, and the town. The latter course may be continued until within a quarter of a cable of the line of the wharves, whence steer south-westward, keeping about the same distance from the wharves, and giving Chappaquidick point a berth of half a cable. Good anchorage may be obtained in 2 to $4\frac{1}{2}$ fathoms between Chappaquidick point and the lower wharves of the village.

From the westward.—Continue the S.E. by E. course given for Main or South channel until cape Poge lighthouse bears S.E. by S. Proceed now for this lighthouse on this bearing until Holmes Hole lighthouse bears N.W. by W. $\frac{3}{8}$ W., open a little north of Oak Bluffs or East Chop, when the course should be altered to S. by E. $\frac{1}{2}$ E. and steered until cape Poge lighthouse bears S.E. by E. $\frac{3}{8}$ E., when proceed S.W. by S. as before directed.

Buoyage.—The buoys and beacons throughout Nantucket and Vineyard sounds, are coloured in accordance with the general system, adopted by the United States Government.

LIFEBOAT STATIONS.—East coast of cape Cod peninsula.—Highland light station, one mile north of Highland lighthouse. Pamet river, about 4 miles south of Highland lighthouse. Cahoon Hollow, $2\frac{1}{2}$ miles south of Pamet river station. Nausett beach, about one mile south of Nausett beacons. Orleans beach, at Orleans point south of entrance to Eastham. Chatham, a short distance south of the lighthouses. Monomoy point station.

Nantucket sound.—Surf-side, on south side of Nantucket island.

ICE in NANTUCKET and VINEYARD SOUNDS.—Mariners are warned that the buoys and light vessels in these sounds, are liable to be carried by the ice from their proper positions; and must not be depended upon. Navigation of this region is always more or less unsafe during the winter months, owing to the strength of the tidal streams, and the danger from drift ice; and strangers should on no account attempt to pass through without a pilot.

Drift ice, in ordinary winters renders the movements of sailing vessels extremely hazardous, between the 1st of January and the middle of March, as if once entangled in a large floe, they will invariably be carried by it, on to the shoals and suffer great damage, if not total destruction.

North channel, is the least obstructed by ice of all the channels, the prevalent north-west winds keeping it clearer than any other part of the sounds.

Hyannis roads, in ordinary weather may be considered comparatively free of ice, but in very severe winters, the movements of sailing vessels in this locality, have been rendered extremely hazardous if not impossible.

Great harbour (Wood Hole), is generally accessible from Vineyard sound, in the severest winters owing to the velocity of the tidal streams.

Vineyard Haven.—In this harbour, local ice is almost always a serious obstruction, to the movements of vessels, and sometimes completely closes the harbour. Thick drift ice also, is dangerous for sailing vessels, and in severe winters has dragged vessels from their moorings, and occasionally driven them ashore. During the winter of 1874-5 this harbour was rendered entirely untenable to vessels of every description, between the 6th and 22nd of February.

Edgartown harbour.—Drift ice is usually driven into this harbour by north-westerly winds, and although not preventing the ingress, or egress, of steamers, renders the movements of sailing vessels, very hazardous. Inner harbour rarely freezes on account of the strength of the tidal streams, excepting in severe winters, when it is closed several days at a time.

TIDES and TIDAL STREAMS in Nantucket and Vineyard sounds.—It is high water full and change at Monomoy at 11h. 58m.; springs rise $5\frac{1}{2}$ feet, neaps 4 feet. Great point at 0h. 6m.; springs rise $4\frac{1}{2}$ feet, neaps $3\frac{1}{2}$ feet. Hyannis at 0h. 3m.; springs rise 4 feet, neaps $3\frac{1}{2}$ feet. Edgartown at 0h. 16m.; springs rise $2\frac{1}{2}$ feet, neaps $1\frac{1}{2}$ feet. Vineyard Haven at 11h. 43m.; springs rise $1\frac{1}{2}$ feet, neaps $1\frac{1}{2}$ feet. Wood Hole (entrance from Vineyard sound) 8h. 34m.; springs rise 2 feet, neaps $1\frac{1}{2}$ feet. Tarpaulin cove at 8h. 4m.; springs rise $2\frac{3}{4}$ feet, neaps 2 feet. Quick hole (entrance from Vineyard sound) at 7h. 36m.; springs rise $4\frac{1}{2}$ feet, neaps 3 feet. The flood or east stream commences near Broken part of Pollock Rip, 2h. 40m. after the moon's meridian passage, its direction and velocity at its maximum strength being N.E. by E. $\frac{1}{2}$ E., $1\frac{1}{2}$ knots per hour. At Shovelful light vessel at 2h. 43m., E.N.E., $1\frac{1}{2}$ knots. Hankerchief light vessel at 3h. 27m., E. by S., $1\frac{1}{2}$ knots. Great point at 4h. 42m., E.N.E. $1\frac{1}{2}$ knots. Cross Rip light vessel at 5h. 13m., E. by N. $\frac{1}{2}$ N., $1\frac{1}{2}$ knots. North channel 4h. 24m. fairly through the channel, $1\frac{1}{2}$ knots. Middle channel 5h. 20m., E. by S. 2 knots. Main or south channel (south of Hedge Fence) 5h. 20m., E.S.E. 2 knots. Between West Chop and Nobska point, at 5h. 36m., E. $\frac{3}{4}$ N., $2\frac{1}{2}$ knots; and in main channel from West Chop to Gay head the flood or east stream commences at 5h. 52m. after the moon's meridian passage its direction and velocity at its maximum strength being E.N.E., $1\frac{1}{2}$ knots per hour. The average duration of this stream, is nearly $6\frac{1}{2}$ hours. The rate of the ebb or west stream is nearly the same as, and the direction nearly the reverse of, those given above, with the exception of Cross Rip light vessel, when the west stream sets at its maximum strength W.N.W. one knot. The average duration of the ebb or west stream, is a little less than 6 hours, there being little or no still water at the changes of the streams.

Between Great point Rip and McBlair shoal the east, or flood stream, at its greatest strength, runs N.E. $\frac{1}{2}$ E. $1\frac{3}{4}$ knots, the ebb W. by S. $\frac{1}{2}$ S., 2 knots per hour.

Near Skiff island Muskeget channel the flood stream commences at 5h. 7m. after the moon's meridian passage and at its maximum velocity, runs N.N.E., $3\frac{1}{2}$ knots, the ebb setting S.W. at the rate of $3\frac{1}{4}$ knots per hour.

The tidal streams run with great velocity through Wood Hole, sometimes as much as 5 knots per hour.

Caution is necessary when near the entrance to Quick Hole in light winds, to prevent being influenced by the stream setting through into Buzzard bay.

NEW BEDFORD HARBOUR.* is situated at the mouth of the Acushet river, on the north-west shore of Buzzard bay, and was formerly the principal whaling port of the United States.

Its entrance points are Sconticut Neck on the north-east, and Round Hill point, on the south-west side, the latter receiving its name from a remarkable hill with a steep face to the southward, one of the principal landmarks in this locality. The city of New Bedford stands on the west bank of the river, 4 miles from the entrance.

LIGHTS.—*Hen and Chickens* light vessel is moored in 10 fathoms water, about half a mile south-east of *Hen and Chickens* reef, painted lead colour, with *Hen and Chickens* on her sides, and exhibits a *fixed* white light, at 25 feet above high water, which is visible 10 miles.

Fog signal.—A bell and horn are sounded in foggy weather.

An automatic whistling buoy painted black, is placed in 8 fathoms water, bearing S.W. by S. distant one mile from this light vessel.

Dumpling Rock (Round Hill).—The light on the eastern Dumpling rock, south-east of Round hill point, is shewn from a tower which rises from the keeper's dwelling. It is white, 33 feet high from the base to centre of lantern, and exhibits, at 42 feet above high water, a *fixed* white light, visible 12 miles. From the westward this light is not visible when bearing east of N.E. by E.

Fog signal.—In foggy weather, a bell is sounded giving *two* strokes in quick succession, alternately with a *single* stroke every *thirty seconds*.

Clark Point.—The lighthouse on the fort at Clark point, on the west side of New Bedford harbour, is white and exhibits, at 68 feet above high water a *fixed* white light, visible 13 miles, when bearing E. by S. $\frac{1}{2}$ S. round north and west to S. by W. $\frac{1}{2}$ W.

Palmer island.—On the north point of Palmer island, in New Bedford Inner harbour, is erected a white lighthouse, 34 feet high, which exhibits, at 38 feet above high water, a *fixed* white light, visible 11 miles.

* See Admiralty plan:—New Bedford harbour, No. 2,880; scale, m = 1·8 inches.

DANGERS.—In the western approach to New Bedford harbour are the following dangers.

Ribbon reef, with 15 feet water on it, lies N.W. $\frac{1}{8}$ W., $1\frac{1}{2}$ miles from Cuttyhunk lighthouse, and W. by S. $\frac{3}{4}$ S. distant $2\frac{3}{4}$ miles from the north point of Penikese island. A nun buoy painted red and black in horizontal stripes is placed in 4 fathoms on the north-west edge of the reef on the same side of the main channel and lying N. by E. $4\frac{1}{2}$ cables from the north extreme of Penikese island is a rock with 3 to 4 fathoms water over it.

Mishaum ledge, with 8 feet water on it, situated S.W. $\frac{7}{8}$ S. distant $1\frac{1}{2}$ miles from Mishaum point, is marked by a black nun buoy, moored in 3 fathoms water, on its south-east side, bearing N.E. $\frac{5}{8}$ E. $3\frac{6}{10}$ miles distant from Hen and Chickens light vessel.

Wilkes' ledge, with 9 feet water on it, is an isolated shoal marked by a buoy, can shaped, and painted red and black with horizontal stripes, placed in 16 feet on its south side and bearing S. $\frac{1}{2}$ E. distant $1\frac{3}{4}$ miles from Dumpling rock lighthouse.

Salter point ledge, dry at extremely low tides, lies on the line joining, and midway between Mishaum point, and Dumpling rock lighthouse. A black spar buoy is placed on its eastern side in 16 feet water.

Directions.—The course from 3 miles south of Block island, to Hen and Chickens light vessel, is N.E. by E. $\frac{1}{4}$ E. and distance 32 miles. From the whistling buoy, moored south-west of the latter, a N.E. by E. $\frac{3}{4}$ E. will lead half a mile south-east of Hen and Chickens light vessel, $1\frac{1}{3}$ miles northward of Ribbon reef buoy, $1\frac{1}{4}$ miles south-east of the buoy on Mishaum ledge and three-quarters of a mile south-east of Wilkes ledge.

DANGERS in WESTERN CHANNEL of New Bedford harbour.—The south side of the shoal water surrounding Dumpling rocks, is marked by a black spar buoy, bearing S. $\frac{1}{2}$ E. distant 2 cables from Dumpling rock lighthouse.

The Sandspit, with 7 feet water over it, is marked by a red spar buoy, placed on the west side bearing S. by E. $\frac{7}{8}$ E., distant half a mile from Dumpling rock lighthouse.

Great ledge, awash at low water has its east and west sides marked by two buoys; the western (red spar) buoy, bearing E. $\frac{5}{8}$ S. distant one mile from the same lighthouse.

Middle ledge, and **Inez rock**, have 3 and 6 feet on them, their east sides being marked by red and black horizontally striped buoys bearing

respectively N.E. $\frac{3}{4}$ N. $1\frac{1}{4}$, and N.E. by N. $1\frac{1}{2}$ miles distant from Dumpling rock lighthouse.

Church, and Decatur rocks, with 9 and 5 feet on them are marked by red spar buoys placed on their south-west sides bearing S. $\frac{1}{4}$ E. 2 miles and S. $\frac{1}{2}$ E. $1\frac{3}{4}$ miles respectively from Clark point lighthouse.

Phinney rock, with 11 feet water and marked by a black spar buoy lies S. $\frac{1}{4}$ E. 6 cables distant from Church rock.

North ledge, an extensive shoal with 7 feet least water on it, is marked by a black nun buoy placed on the eastern side in 3 fathoms water and bearing S. by E. $\frac{1}{4}$ E. distant $1\frac{3}{4}$ miles from Clark point lighthouse.

Old Bartlemy, with one foot water over it, is the eastern termination of the shoal water from Clark point, and is marked with a black spar buoy placed in 3 fathoms, and bearing E. by N. 2 cables from Clark point lighthouse.

Butler flat, with 4 to 14 feet water on it, extends 4 cables eastward from the west shore, half a mile north of Clark point, narrowing the channel between the depths of 3 fathoms, to the width of one cable. A black spar buoy is placed in 3 fathoms, bearing S. by E. $\frac{1}{2}$ E., $1\frac{1}{2}$ miles distant from Palmer island lighthouse.

Egg island flats, on the eastern side of the channel, extend $1\frac{1}{2}$ miles southward from Fort point, and dry in many places at low water, being marked by a red spar buoy, placed in 12 feet water on the south-western side bearing N.E. $\frac{1}{4}$ N. one mile from Clark point lighthouse.

Egg rock beacon, built upon the westernmost dry rock on this extensive shoal, is cone shaped, painted white, and bears S.S.E. $\frac{1}{2}$ E. $1\frac{4}{10}$ miles distant from Palmer island lighthouse.

Eleven feet bank, is the name given to the southern termination of the shoal water surrounding Palmer island. A black spar buoy is placed in 13 feet water near the eastern edge, bearing S. by E., a little more than half a mile distant from Palmer island lighthouse. Northward of this buoy, the channel is very narrow and is marked by red and black buoys in the customary manner.

Directions. — By Western channel. — In proceeding N.E. by E. $\frac{3}{4}$ E. up Buzzard bay as before directed, when Dumpling rock lighthouse bears N.N.E. $\frac{3}{4}$ E., and Guttybunk lighthouse S. by W. $\frac{1}{2}$ W., each distant $3\frac{1}{2}$ miles nearly; alter course to N.N.E. $\frac{3}{4}$ E. This continued course leads midway between Dumpling rocks, and Sandspit buoys, $1\frac{1}{2}$ cables east of Middle ledge, half a mile westward of North ledge, in not less than 22 feet water, to abreast Clark point lighthouse. When the latter bears W. by N. distant about 6 cables steer N. $\frac{1}{2}$ W. for Fairhaven tower in line

with Fort point (white, triangular) beacon, until nearly abreast Butler Flat buoy, whence the course is N. by W. $\frac{3}{4}$ W. for Palmer island lighthouse in line with the tallest chimney of Wamsutta mills.* This course leads in 16 feet water, to abreast the south red buoy on Fort Flat, whence a N. $\frac{1}{4}$ W. course leads between the red and black buoys in not less than 16 feet water, to the anchorage in 3 to 4 fathoms under the Fairhaven shore.

DANGERS in EASTERN CHANNEL.—The dangers dividing this from western channel, have already been alluded to, those lying on the eastern side of this channel are as follows:

Hursell rock with 14 feet water, is the shoalest part of Negro ledge and bears E. $\frac{1}{4}$ N. $2\frac{6}{10}$ miles from Dumpling rock lighthouse, and S. by E. $\frac{7}{8}$ E. distant $3\frac{1}{10}$ miles from Clark point lighthouse.

Henrietta rock, with 11 feet water on it, lies about a mile southwestward of Sconticut point, and is marked by a red and black horizontally striped spar buoy, placed on its west side, and bearing S.E. $\frac{3}{4}$ S. distant 2 miles from Clark point lighthouse.

Mosher ledge, with 6 feet, is marked with a red spar buoy moored in 3 fathoms, $1\frac{1}{2}$ cables from the shoal, and bearing S.E. $\frac{3}{4}$ S. from Clark point lighthouse in line with Henrietta rock buoy, from which it is distant three quarters of a mile.

Packet rock ledge, with 5 feet water over it, lies westward, distant three quarters of a mile from Sconticut point. Its eastern side is marked by a black, and its western side by a red spar buoy; the latter bearing S.E. easterly distant $1\frac{2}{3}$ miles from Clark point lighthouse.

Directions.—With Dumpling rock lighthouse bearing N.W. $\frac{3}{4}$ W. distant $2\frac{2}{3}$ miles and Clark point lighthouse N. $\frac{3}{4}$ W., about $4\frac{2}{3}$ miles, steer N. $\frac{1}{2}$ E. with not less than 5 fathoms water, until Dumpling rock lighthouse bears W. by S., and Fairhaven tower is in line with Fort point beacon, bearing N. $\frac{1}{2}$ W. Continue with this mark on, following the directions given for western channel.

The above courses lead between Phinney and Hursell rocks, and between North ledge and Henrietta rock buoys.

Or Fairhaven tower in line with Fort point beacon, N. $\frac{1}{2}$ W., may be steered for, as soon as they are discernible.

Ice.—Steam vessels can generally make their way into, and out of Bedford harbour, during the winter, but sailing vessels require the assistance of a powerful tug to break the ice.

During very severe winters, the harbour is occasionally closed to all navigation, and the heavy drift ice apt to displace the buoys.

* Wamsutta mills are two large stone buildings with three tall chimneys, situated in the northern part of the city.

In the severe winter of 1875, the whole of Buzzard bay was closed during the latter part of February, as far west as a line joining Round Hill point and Cuttyhunk island.

Tides.—It is high water, full and change, at New Bedford at 7h. 57m. springs rise $4\frac{1}{2}$, neaps 4 feet.

The depth of water over the shoals is given above *mean* low water; at low water spring tides there is half a foot less.

NEWPORT HARBOUR,* on the west side of Rhode island, Narragansett bay, has two entrances separated by Goat island.

The northern and better entrance, has 21 feet, and the southern 15 feet at mean low water. The city of Newport occupies the whole of the east side of the harbour.

LIGHTS.—*Brenton reef light vessel* lies in $14\frac{1}{2}$ fathoms in the entrance of the eastern passage to Narragansett bay, painted straw colour, with *Brenton Reef* in black letters on her sides, and exhibits *two fixed* white lights, elevated 50 and 40 feet above high water, visible 12 miles.

Fog signal.—In foggy weather, a bell and gong are sounded.

Whale Rock.—From a lighthouse erected on a pier at Whale rock, western passage to Narragansett bay, is exhibited a fixed *red* light, visible through an arc of 315° , or between the bearings of E.N.E., through north, and E.S.E. It is elevated 69 feet above high water (43 feet above the ground), and should be visible in clear weather from a distance of 14 miles.

Fog signal.—During thick or foggy weather a bell will give *one* blow at intervals of *twenty seconds*.

Beaver Tail lighthouse is situated on the south point of Conanicut island, separating the eastern and western passages to Narragansett bay. The light, 45 feet above the ground, is shewn from a tower built of granite, square, and attached to the south-east angle of the keeper's dwelling, exhibiting, at an elevation of 68 feet above high water, a *fixed* white light, visible 13 miles, between the bearings of S.W. $\frac{3}{4}$ W. (through north and east) and S.E. $\frac{3}{4}$ E.

Fog signal.—In foggy weather a trumpet will give blasts of *six seconds* duration at *alternate* intervals of *ten and fifty seconds*.

Lime Rock.—This lighthouse is erected on Lime rock, on the south side of Newport harbour. The light is shown on the north-west corner of the keeper's house, which is whitewashed. It is a *fixed red* light, 30 feet above high water, and can be seen 10 miles, between the bearings of W.N.W. and E.N.E.

* See Admiralty chart:—Narragansett bay, No. 2,892; scale, m. = 1·75 inches.

Newport Harbour (Goat Island).—On the north extreme of the breakwater extending off Goat island, is shown from a white stone tower, 29 feet high, attached to the keeper's dwelling, a *fixed* white light, 33 feet above high water, visible from a distance of 11 miles.

Fog signal.—In foggy weather a bell will be sounded at intervals of *fifteen seconds*.

A light is exhibited from a dolphin erected on the south point of Goat island.

Rose island lighthouse is situated on the south-west point of Rose island, Narragansett bay. The *fixed red* light shewn from a tower surmounting the keeper's one storeyed dwelling is 38 feet above the ground, 58 feet above high water and visible 11 miles.

The lantern is painted black, the remainder of the building drab.

DANGERS.—**Brenton reef** extends south-westward half a mile from Brenton point at which distance it is awash at low water, and is marked by a red spar buoy placed in 3 fathoms south-west of the reef bearing from the light vessel N.E. by E. $\frac{1}{4}$ E. distant one mile. Between the latter and the buoy the passage is about a mile wide with 9 to 14 fathoms water. The buoy should be given a good berth as the flood stream sets strongly on to the reef.

Buller Ball rock above high water lies three-quarters of a cable from the south extreme of Castle hill.

Newton rock lies $1\frac{1}{4}$ cables S.S.W. $\frac{1}{2}$ W. from Beaver Tail lighthouse. It dries at low water, and is marked by a red and black horizontally striped buoy placed in $5\frac{1}{2}$ fathoms, bearing S.W. $\frac{1}{2}$ S., distant 3 cables from the same lighthouse.

Kettle Bottom rock, above high water lies $1\frac{1}{2}$ cables S. by E. $\frac{3}{4}$ E. from the north-east entrance point of Mackerel cove in Conanicut island. To avoid it, keep Goat island lighthouse open east of fort Dumpling N.E. by E. $\frac{3}{4}$ E.

The Dumplings are a cluster of rocks above high water, the easternmost of which bears N.E. $1\frac{1}{4}$ cables from Bull point.

Rose island point extends $1\frac{1}{2}$ cables southward from Rose island, and is marked by a beacon erected in 7 feet water, bearing S.E. $\frac{3}{4}$ S., distant nearly $1\frac{3}{4}$ cables from Rose island lighthouse. A small shoal of 14 feet lies E. $\frac{1}{2}$ S. $1\frac{1}{2}$ cables from the beacon.

Tracey ledge is a small detached rock with $9\frac{1}{2}$ feet water on it, the western side of which is marked with a black spar buoy in $4\frac{1}{2}$ fathoms bearing N.E. $\frac{3}{4}$ E. distant $3\frac{3}{4}$ cables from Rose island lighthouse.

St. Patrick rock, with 8 feet water on it, lies three-quarters of a cable off the east shore, and is marked by a red spar buoy, bearing N.N.E. $\frac{3}{4}$ E., distant $3\frac{3}{4}$ cables from Goat island lighthouse. Exactly midway

between the latter and the buoy is situated a spot with 18 feet water over it.

Brenton cove rock, with 10 feet water over it, lies in the mouth of Brenton cove. It is marked by a red spar buoy, bearing W. by N. $\frac{3}{8}$ N., 3 cables distant from Lime rock lighthouse.

Goat island shoal, with one foot water on it, extends three-quarters of a cable southward from the south extreme of Goat island. A black nun buoy is placed in 16 feet water, bearing E. $\frac{3}{4}$ N., $3\frac{1}{2}$ cables distant from Brenton cove rock buoy.

Little Lime rock lies $1\frac{3}{4}$ cables from the wharf line of the southern part of the city. Upon it is erected a beacon bearing E. by N. $\frac{3}{4}$ N., distant $3\frac{1}{2}$ cables from Lime rock lighthouse.

Directions for entering Newport harbour north of Goat island.—From Brenton reef light vessel steer N.N.E. $\frac{1}{8}$ E. until past Castle Hill, and when Goat island lighthouse bears N.E. by E. $\frac{1}{4}$ E., steer for it until Rose island lighthouse bears N.N.E. $\frac{1}{2}$ E., thence N.E. $\frac{3}{8}$ E. for St. Patrick rock buoy, and when Goat island lighthouse bears S. by E. $\frac{7}{8}$ E., distant $1\frac{1}{2}$ cables, steer E. $\frac{7}{8}$ S. until the same light bears S.W. by W. $1\frac{3}{4}$ cables distant. From this position proceed S. by W. into the harbour, and anchor after passing the lighthouse in $3\frac{3}{4}$ fathoms good holding ground.

South of Goat island.—Continue the N.E. by E. $\frac{1}{4}$ E. course for Goat island lighthouse, until Lime rock light bears S.E., when steer for it, until Rose island lighthouse bears N. by W. $\frac{7}{8}$ W., and Little Lime rock beacon is nearly in line with Goat island shoal buoy. Alter course now to E. $\frac{5}{8}$ S., with these objects nearly ahead, passing close south of the latter, and when Lime rock lighthouse bears S.W. $\frac{5}{8}$ S., steer N.N.E. into Newport harbour. Good anchorage in 7 to 9 fathoms water, will be found between Rose island and Goat island lighthouse, with the latter bearing from East to E.S.E.

ICE.—The inner harbour of Newport is usually closed by ice, during the months of January and February, a narrow channel only being kept open by the New York steam vessels, from the end of Goat island breakwater to their wharves, at the north part of the city.

In addition to this, an "ice gorge" is sometimes formed in the narrow passage between Forts Adams and Dumpling, completely blocking it. This "gorge" is caused by a continuance of North and N.E. winds, but is of short duration.

Tides.—It is high water, full and change, at Newport, at 7h. 45m.; springs rise $4\frac{1}{4}$ feet, neaps 4 feet.

The foregoing depths are above the level of mean low water; the level of low water springs is .5 inches lower.

CHAPTER II.

LONG ISLAND SOUND TO CHESAPEAKE BAY.

VARIATION IN 1882.

Sandy Hook - $7^{\circ} 0' W.$ | Delaware river entrance $5^{\circ} 0' W.$

BLOCK ISLAND SOUND* is the name given to the sheet of water contained between Judith point, Block island, and Montauk point on the east, and south; Gardiner and Fisher islands on the west, and the shores of Connecticut and Rhode island on the north. Its greatest length and breadth are 26 and $13\frac{3}{4}$ miles respectively.

The most conspicuous landmarks in Block island sound are Beacon hill, the most prominent of four hills on Block island; Watch hill near the point of that name, mount Prospect with its steep fall to the southward, situated near the south-west part of Fisher island, Choco mount a dark looking hill, the highest part of the same island, and Lantern hill five miles northward of Mystic. The latter is dome-shaped and will be the first land seen in approaching Block island sound from seaward.

There are few anchorages in Block island sound, but it is important as being the thoroughfare for all the trade to Long island sound from the eastward.

LIGHTS.—**Judith Point lighthouse** is a white stone tower, 46 feet high, on the south extremity of Narragansett shore. It exhibits a *flashing* white light, the intervals between the flashes being *fifteen seconds*, at an elevation of 67 feet above high water, visible in clear weather from a distance of 14 miles. From the westward this light is not visible when bearing east of E. by N.

Fog signal.—In foggy weather a syren is sounded, giving blasts of *six seconds*' duration, at intervals of *forty seconds*.

Block island (north) lighthouse is situated on the north extremity of Block island, to guide vessels clear of the low sand point extending from the north extreme of the island. The lighthouse erected on the keeper's dwelling, is painted light brown, and exhibits, at an elevation of 46 feet above the ground, and 61 feet above high water, a *fixed* white light, visible in clear weather from a distance of 13 miles, except between the bearings of N.N.E. round northward to N.W. by W. $\frac{1}{2}$ W.

Block island (south-east).—This lighthouse is erected on the south-east extreme of Block island. The tower is octagonally shaped,

* See Admiralty charts:—Long island sound, Sheet I. No. 2,754, scale, $m = 0\cdot7$ inch; and Block island to Great Egg harbour, No. 2,480, scale, $m = 0\cdot2$ of an inch.

attached to the keeper's two storey dwelling, both being coloured red. From an elevation of 52 feet above the ground, and 204 feet above high water is exhibited a *fixed* white light, visible 20 miles when bearing from E. by N. (round north and west) to S. by W.

Fog signal.—In foggy weather a syren is sounded, giving blasts of *four seconds* duration at intervals of *thirty seconds*.

Block island breakwater range (front).—On the extremity of the government pier on the east side of the entrance to Basin harbour Block island, is erected a stake, from which is exhibited at an elevation of 12 feet above high water, a *fixed red* light, visible 6 miles.

Block island breakwater range (rear).—On the shore, bearing S.S.W., distant 115 yards, from the front light, is placed a mast 48 feet high, exhibiting at an elevation of 60 feet above high water, a *fixed red* light visible 6 miles.

Montauk point lighthouse stands on Montauk point, the eastern extremity of Long island. It is painted white, 100 feet high, and exhibits, at an elevation of 169 feet above high water, a *fixed* white light varied *every two minutes by a white flash*. The fixed light is visible 19 miles, and the white flash from 3 to 5 miles farther, between the bearings of N.E. round north, west and south to S.E. by E. $\frac{1}{4}$ E.

Fog signal.—In foggy weather a trumpet will sound, giving blasts of *twelve seconds* duration at intervals of *fifty seconds*.

Gardiner island.—This lighthouse attached to the keeper's dwelling, is situated on the north extreme of Gardiner island. It is painted dark brown, and from an elevation of 26 feet above the ground, and 33 feet above high water, exhibits a *fixed* white light, visible 11 miles, excepting between the bearings of N.W. $\frac{1}{4}$ N. and N. $\frac{1}{4}$ E.

Little Gull island lighthouse is erected upon the island of that name situated on the south-west side of the main entrance to Long island sound. It is connected with the keeper's dwelling, the latter being of red and the tower of gray colour, and from an elevation of 92 feet above high water, exhibits a *fixed* white light, visible 17 miles, except between the bearings of E.N.E. and N.E.

Fog signal.—In foggy weather a syren is sounded, giving blasts of *five seconds* duration, at intervals of *forty seconds*.

Race rock lighthouse is built upon Race rock, situated half a mile south-westward from Race point, the south-west extreme of Fisher island. The tower surmounts the keeper's dwelling, both being of gray colour, exhibiting from an elevation of 40 feet above the ground, and 68 feet above high water, a *flashing red* and *white* light, visible in clear

weather from a distance of 14 miles. The *alternate red and white flashes* follow each other at intervals of *thirty seconds*, each flash being succeeded by a short period of *total eclipse*.

Fog signal.—In thick weather a bell is sounded, giving *two strokes* in quick succession *every twenty seconds*.

Watch Hill.—On Watch hill point, about 3 miles south-east of Stonington, is erected a granite lighthouse 40 feet high from the base to centre of lantern (attached to the south-east corner of the keeper's white dwelling), which exhibits, at 62 feet above high water, a *fixed* white light, visible from a distance of 13 miles, between the bearings of W. $\frac{3}{4}$ S. by north to E. $\frac{3}{4}$ S.

DANGERS IN BLOCK ISLAND SOUND.—**Squid ledge**, with 13 feet least water on it, lies on the western side of Judith point. It is three-quarters of a mile long in a north and south direction, and its south extreme bears W. $\frac{1}{8}$ S., $1\frac{1}{10}$ miles distant from Judith point lighthouse. To pass south of it, the latter should not be brought to bear east of E. by N. $\frac{1}{4}$ N.

Block island North reef is a dangerous rocky ledge, extending one mile in a northerly direction from Sandy point, the north extreme of Block island. The depths on the reef vary from 2 to 12 feet, as little as 5 feet being found at the distance of $1\frac{1}{4}$ miles from the lighthouse. A black nun buoy is placed in 4 fathoms, close to the north extreme of the reef bearing N. $\frac{3}{4}$ E., nearly $1\frac{1}{2}$ miles distant from Block island north lighthouse.

South-west ledge, with 5 to 6 fathoms water, is $1\frac{1}{2}$ miles long in a N.E. by E. and S.W. by W. direction, and 6 cables broad. Its north-east extreme is $2\frac{1}{2}$ miles distant from the south-west part of Block island, and bears W. $\frac{1}{2}$ S., nearly 5 miles from Block island south-east lighthouse. The south-west extreme bears W. by S. $\frac{3}{8}$ S., $6\frac{1}{10}$ miles distant from the same lighthouse, which should not be brought to bear east of E. by N. $\frac{3}{4}$ N. in order to pass south of the ledge. In easterly and southerly gales, the sea breaks on it with great violence. An automatic whistling buoy painted red and black in horizontal stripes, is placed on the eastern side of the ledge in 10 fathoms water, bearing S.W. $\frac{3}{4}$ S. and W. by S. respectively, from Block island north, and south-east lighthouses.

Montauk shoal with 4 fathoms water, lies $2\frac{1}{2}$ miles S. by E. from Montauk point lighthouse, and breaks heavily in southerly and easterly gales. It generally shows itself by rips.

Phelps ledge, is the name given to the shallowest part of a shoal extending $1\frac{3}{4}$ miles in a north and south direction, and situated $1\frac{1}{2}$

miles eastward of Montauk point. At the southern extremity of Phelps ledge, is a small rock with 4 fathoms water on it, named Great Eastern rock bearing E. $\frac{1}{2}$ N. distant $1\frac{1}{2}$ miles from Montauk point lighthouse. A black nun buoy is placed S.W. by W. distant a quarter of a mile from this rock. There are usually well marked tide rips on Phelps ledge and between it and Montauk point.

Shagwong reef, with 5 feet least water on it, is situated $1\frac{6}{10}$ miles northward of Shagwong point, and is marked by a bell boat, bearing N.W. $\frac{3}{4}$ N., distant $3\frac{3}{4}$ miles from Montauk point lighthouse.

Midway between this reef and Shagwong point is Washington shoal with 2 fathoms least water over it.

Middle ground or Cerberus shoal is a dangerous shoal about $1\frac{1}{4}$ cables in diameter, having 13 feet water upon it, and situated S. by E., easterly $5\frac{1}{10}$ miles distant from the south extreme of Fisher island (near Prospect mount), and N. by W. $\frac{1}{2}$ W. $5\frac{3}{4}$ miles from Shagwong point. An automatic whistling buoy painted red and black in horizontal stripes, is placed in 7 fathoms, south-eastward of the shoal, bearing as follows from the undermentioned lighthouses, viz.:—from Watch hill S.W. $\frac{1}{2}$ S., Montauk point N.N.W. $\frac{3}{4}$ W., Gardiner island E. $\frac{1}{2}$ N., and from Race rock S.E. $\frac{3}{4}$ S.

Approaching Cerberus shoal from the northward, Gardiner island lighthouse must not be brought to bear west of W. $\frac{3}{4}$ S., or Race rock lighthouse northward of N.W. $\frac{1}{2}$ W.

Directions.—Main channel, north of Block island.—If from Vineyard sound, with the light vessel of that name bearing N.W. $\frac{3}{4}$ W., distant 2 miles and depth 12 fathoms, steer West (southerly) carrying not less than 8 fathoms, until Block island north lighthouse bears S. $\frac{1}{2}$ W. distant a little more than 3 miles. At this position the depth of water will be 20 fathoms, and the course West (northerly) through Block island sound to The Race, Long island sound. The above courses pass $1\frac{2}{3}$ miles northward of Block island North reef buoy, $3\frac{1}{2}$ miles north of Cerberus shoal whistling buoy, 3 miles southward of Watch hill reef, and $1\frac{1}{2}$ miles southward of Race rock lighthouse.

From Buzzard bay the course is W. $\frac{1}{2}$ S. from Hen and Chickens light vessel until Judith point lighthouse bears N. $\frac{1}{2}$ E. distant one mile, where it may be continued to The Race, or altered to West (northerly) for the eastern entrance to Fisher island sound.

Passage between Block island and Montauk point.—This is sometimes known as Block island channel, and is the passage commonly taken by vessels which have passed south-eastward or outside of Nantucket shoals, bound into Long island sound. From the position previously

alluded to (page 67) in connection with passing east of these shoals, viz.—S.E. $\frac{1}{4}$ E. distant 28 miles from Nantucket, New South shoal light vessel, the course for Montauk point lighthouse is N. 78° W. (True). When within $8\frac{3}{4}$ miles of the latter and Block island south-east lighthouse bears N.E. distant $8\frac{1}{2}$ miles the depth will be 28 fathoms, and the course to The Race N.W. $\frac{5}{8}$ W.

This last course passes $3\frac{1}{2}$ miles south-westward of South-west ledge, $1\frac{1}{2}$ miles north-eastward of the shoalest part of Phelps ledge, the same distance north-eastward of Shagwong reef buoy, and half a mile south of the whistling buoy on Cerberus shoal.

From Nantucket New South shoal light vessel, the course to Montauk point lighthouse is W. by N. $\frac{1}{4}$ N. When within $8\frac{3}{4}$ miles of it, and Block island south-east lighthouse bears N.E. $\frac{1}{2}$ E., distant $7\frac{3}{8}$ miles, steer N.W. $\frac{3}{4}$ W., (westerly) with not less than 7 fathoms to The Race, passing $2\frac{1}{2}$ miles south-westward of South-west ledge, one mile north of the north extreme of Phelps ledge, 2 miles north of Shagwong reef, and a quarter of a mile southward of Cerberus shoal buoy.

In thick weather when approaching Block island sound from seaward, the lead should be kept going, and strangers should not stand into less than 20 fathoms, until the weather clears.

FORT POND BAY in Block island sound is an indentation on the northern shore of Long island. Its east and west entrance points are Culloden, and Rocky points, the former being situated W. $\frac{2}{3}$ S., distant $2\frac{1}{2}$ miles from Shagwong point. The bay is a little over a mile in width, has a depth of 4 to 8 fathoms over good holding ground, and affords excellent shelter in southerly and easterly winds.

Directions for entering Fort Pond bay. — On the N.W. $\frac{3}{4}$ W. (westerly) course through the southern part of Block island sound, when Montauk point lighthouse bears S. by E. $\frac{1}{4}$ E., distant nearly 5 miles and Choco mount bears N. by W., the depth will be 17 fathoms, mud. The course may now be altered to S.W. $\frac{2}{3}$ W. and continued until Culloden point bears South, distant $1\frac{1}{2}$ miles, or Gardiner island lighthouse bears N.W. by W. $\frac{1}{2}$ W., when steer S. by W. into the bay and to the anchorage with not less than 6 fathoms.

Anchorage and shelter in strong westerly winds, may be obtained on the west side of Napeague bay, under the eastern shores of Gardiner island.

ICE in Block island sound. — In severe winters, during the middle of February, the whole of the sound has been covered with heavy ice, extending as far east as Judith point, and Block island, and to a distance varying from 5 to 15 miles, seaward of Montauk point. The buoys are liable to be moved from their proper positions by drift ice.

Lifeboats are stationed at the following places in Block island sound, Block island basin, on east side of Block island. Near the south-west extreme of the same island, $5\frac{1}{2}$ miles westward of Montauk point, and near Montauk point lighthouse.

TIDES AND TIDAL STREAMS in Block island sound.—It is high water, full and change, at Judith point, at 7h. 32m. ; springs rise $3\frac{1}{2}$ feet neaps 3 feet ; and at Plum Gut (western extremity of the sound) at 10h. 12m. ; the mean rise and fall being $2\frac{1}{2}$ feet.

At $2\frac{1}{10}$ miles N.E. $\frac{1}{4}$ N. from the north extreme of Block island north reef, the flood or west stream turns 18 minutes before the moon's transit, the direction and velocity of the flood stream at its greatest strength, being N. $\frac{5}{8}$ W. $1\frac{1}{2}$ knots per hour ; those of the ebb or east stream, being E. by N., $2\frac{3}{4}$ knots. Between Montauk point and Block island, the flood stream turns 44m. before the moon's transit, both flood and ebb at their greatest strength running respectively N.W. $\frac{1}{8}$ N. $1\frac{1}{4}$, and S.E. by S. $2\frac{1}{2}$ knots per hour.

At 2 miles E.S.E. from Montauk point, the flood turns 22m. before the moon's transit, flood and ebb streams running respectively N. $\frac{1}{8}$ W. 2 knots and S. by E. $\frac{1}{8}$ E. at the same rate. North 2 miles from Montauk point the flood stream turns to ebb, at 2h. 1m. before the moon's transit, the direction and velocity of flood and ebb streams, at their maximum strength, being N.W. $\frac{1}{4}$ N. 2 knots, and S.E. $\frac{5}{8}$ S. 2 knots per hour respectively. At $1\frac{1}{2}$ miles N.N.E. $\frac{3}{4}$ E. from Cerberus shoal, the flood turns 46m. before the moon's transit, the flood setting W. by N. $\frac{5}{8}$ N. $1\frac{1}{2}$, and the ebb E. $\frac{1}{2}$ S. 2 knots per hour. Northward of Fort Pond bay, the flood stream turns 2h. 7m. before moon's transit, the set of flood and ebb being respectively W. $\frac{1}{8}$ N. three-quarters of a knot, and E. by N. $\frac{1}{8}$ N., one knot per hour. Eastward $2\frac{1}{2}$ miles from Gardiner point, the flood turns 58 minutes before the moon's meridian passage, the flood running N.W. $1\frac{1}{2}$, and the ebb E.S.E. 2 knots per hour, S.E. 2 miles distant from Walsh hill point, the flood turns 0h. 44m. before the moon's transit, the flood and ebb streams at their greatest strength setting W. $\frac{1}{8}$ N. $1\frac{1}{4}$, and S.E. $\frac{5}{8}$ E. one knot per hour respectively.

GARDINER BAY, is separated from Block island sound by Gardiner island, on the west side of which, and between Gardiner point and a bluff point $2\frac{1}{2}$ miles to the southward named Crow head, is an unobstructed bight named Bostwick bay, containing excellent anchorage, in 3 to 4 fathoms, protected from all but westerly winds.

DANGERS.—Constellation rock with 21 feet water lies N.E. $\frac{1}{8}$ E. $2\frac{1}{2}$ miles from Gardiner island lighthouse ; at $4\frac{1}{2}$ cables southward of Constellation rock is another rock, with 22 feet water, a spar buoy

painted black and red in horizontal stripes is moored near this rock, with Gardiner island lighthouse, bearing S.W. $\frac{3}{4}$ W., distant $2\frac{2}{10}$ miles.

Bedford reef lies with its eastern extreme bearing S.E. $\frac{3}{4}$ E., distant $1\frac{1}{3}$ miles from the north point of Plum island. It is about half a mile in diameter, and has 13 feet at low water.

Directions for anchoring in Bostwick bay.—On the N.W. $\frac{3}{4}$ W. (westerly) course through the southern part of Block island sound, when Montauk point lighthouse bears S. $\frac{1}{4}$ W., distant $3\frac{3}{4}$ miles, and depth of water 11 fathoms, steer W.N.W. until Little Gull island lighthouse bears N.W. $\frac{1}{2}$ N. and Gardiner island lighthouse W. $\frac{1}{4}$ S. (southerly), distant $5\frac{1}{4}$ miles. From this position, a W. $\frac{1}{4}$ N. course will lead with not less than 9 fathoms to the entrance of Gardiner bay. When Gardiner island lighthouse bears S.E. $\frac{3}{4}$ E. about one mile distant steer S. by E. $\frac{3}{4}$ E., and anchor under the north spit of Gardiner island, according to draught.

FISHER ISLAND SOUND lies between the mainland of Connecticut on the north, and Fisher island on the south, and is little more than 7 miles in length. It is entered from Block island sound between Watch hill point, and the eastern extreme of Fisher island known as east point; uniting with Long island sound, on the line joining Race point (the western extreme of Fisher island), and Pine island, lying a short distance eastward of the entrance to New London harbour. On the north side of the sound, are the harbours of Stonington, and Mystic, and on the south side East and West harbours, but as they are not suitable for vessels drawing over 9 or 10 feet water, and difficult of access without pilots, Fisher island sound will be treated chiefly as a means of communication between Block, and Long island sounds.

There are several channels leading between the shoals in the eastern portion of the sound, the most suitable of which, is the one known as Watch hill channel, through which not less than $4\frac{1}{4}$ fathoms can be carried at mean low water. The streams also in this channel run nearly parallel with the fairway courses, and though there are many detached dangers, they are so well marked by beacons and buoys coloured in the usual way that with a leading wind, and ordinary care, this channel may be safely used in the daytime, by following the directions herein given.

LIGHTS.—Stonington Harbour.—Stonington lighthouse, on the east entrance point of the harbour, rises from the keeper's dwelling. It is coloured white, and exhibits, at 59 feet above high water, a *fixed* white light, visible 11 miles, when bearing from N.N.W. (through north) to East.

Eel Grass shoal light vessel, painted lead colour, with *Eel Grass* on each side, is schooner rigged and lies on the south side of Eel Grass shoal, exhibiting at 32 feet above high water, a *fixed* white light, visible 10 miles.

Fog signal.—In foggy weather a bell and horn are sounded.

Morgan point (Mystic) lighthouse, attached to the keeper's dwelling is situated on the west entrance point of Mystic river. It is white, 44 feet high, and exhibits, at 61 feet above high water, a *fixed* white light, visible 11 miles. From the eastward the light is not visible when bearing eastward of N.N.E.

North Dumpling lighthouse, on keeper's dwelling, is 39 feet high, and exhibits, at an elevation of 70 feet above high water, a *fixed red* light, visible 11 miles.

Fog signal.—In foggy weather a bell is sounded at intervals of fifteen seconds.

DANGERS on north side of Watch hill channel.—**Gangway rock** with 2 feet water on it, lies S. by W., $1\frac{1}{2}$ cables distant from Watch hill lighthouse, and is marked with a red spar buoy, placed in $3\frac{1}{2}$ fathoms, on its south-east side.

Napatree point ledge extends S.W. by W., 2 cables from the point of that name, with a depth of 5 feet, half that distance from the shore. A red can buoy is placed in $3\frac{1}{2}$ fathoms, bearing W. $\frac{3}{8}$ N. distant $1\frac{4}{5}$ miles, from Watch hill lighthouse.

The Middle Ground is the name given to the south-west part of the shoal water extending from Napatree and Sandy points, and is marked by a red can buoy, placed in 3 fathoms, on its western side, bearing E. $\frac{1}{2}$ N. distant $1\frac{1}{10}$ miles from Latimer reef beacon. Watch hill lighthouse E. by S. $\frac{1}{4}$ S., in line with the south extreme of Napatree point, leads south of this bank.

Latimer reef lies about three-quarters of a mile northward from East point, Fisher island. It consists of two detached ledges, 3 cables apart, the western of which dries at low water, and is marked by a beacon. The eastern reef has 3 feet water over it, and is marked by a buoy placed in 15 feet close to its south-east side. Both beacon and buoy are painted red and black in horizontal stripes, the former bearing S.E. by E. $\frac{1}{2}$ E. distant $6\frac{1}{2}$ cables from Eel Grass light vessel.

Eel Grass shoal, with 5 feet water, is well marked by the light vessel of that name, moored S.E. by S., $1\frac{3}{4}$ cables distant from the south extreme of the shoal.

Ram island reef, dry at low water and marked by a red beacon, lies S.S.E. $3\frac{1}{4}$ cables distant from the south extreme of Ram island. Shoal water extends S. by E. $\frac{1}{2}$ E. 2 cables from the dry rock, and is marked by a red can buoy, which bears W. $\frac{2}{3}$ S., distant $1\frac{1}{4}$ miles, from Eel grass light vessel.

Groton Long point beacon stands upon the south extreme of a reef, dry at low water, extending 2 cables from the point of that name.

Sea-flower or Potter reef, dry at low water, is dangerous as lying nearly in the centre of the western entrance to Fisher island sound. It is surrounded with deep water, and has erected upon it a beacon, painted red and black in horizontal stripes, bearing N.W. (northerly), a little over three-quarters of a mile distant from North Dumpling lighthouse.

Horse-shoe reef, dry at low water spring tides, lies in the mouth of Mumford cove, and is marked by a red spar buoy moored in 4 fathoms, near its south extremity, bearing N.E. $\frac{1}{2}$ N. nearly three-quarters of a mile, from Sea-flower reef beacon.

Dangers on the south side of Watch hill channel.—
Watch hill reef dry at low water is marked by a beacon, bearing S.W. by S. (southerly), distant $5\frac{3}{4}$ cables, from Watch hill lighthouse, shoal water extends from it E. by N. $\frac{3}{4}$ N., $1\frac{1}{2}$ cables, at which point is placed a bell buoy, bearing S. by W. $\frac{7}{8}$ W. distant half a mile from the same lighthouse. A shoal with 2 to 3 fathoms, separated from Watch hill reef by a narrow channel of 5 fathoms water, extends in a N.E. by N. direction from the latter to within $2\frac{1}{2}$ cables of Watch hill point.

Sugar reef is composed of several rocks dry at low water, the north-eastern most being marked by a black beacon, bearing W.S.W., distant nearly a mile from Watch hill lighthouse. To avoid the shoal water extending northward from it, the beacon should not be approached nearer than $1\frac{1}{4}$ cables.

Wicopesset reef, surrounding the island of that name, extends N.E. $2\frac{3}{4}$ cables and N.W. $2\frac{1}{4}$ cables from the latter.

Wicopesset rock with 4 feet over it, has erected upon it a beacon known as West spindle, bearing E. $\frac{7}{8}$ N. distant 3 cables from Wicopesset island. To pass north of Wicopesset reef and rock, Watch hill lighthouse should not be brought to bear eastward of E. $\frac{1}{2}$ S.

Between Wicopesset rock and Sugar reef, are three shoals, separating channels used by those locally acquainted, but which are not in the way of vessels proceeding through Watch hill channel with a leading wind.

Seal rocks, dry at low water lie north-westward of East point. A black buoy is placed in 15 feet, on their northern side, bearing S. by E., distant nearly half a mile from Latimer reef beacon.

East Clump bearing W. $\frac{3}{4}$ N. leads north of Seal rocks.

Young rock, situated about $3\frac{1}{2}$ cables westward of the Seal rocks, dries at low water and its west side is marked by a black buoy, placed in 15 feet, bearing S.W. by S. a little over half a mile distant from Latimer reef beacon.

East Middle, and **West Clump**, are the names given to three small and low islets, comparatively bold to on their northern sides, situated respectively S.W. $\frac{1}{4}$ S., nearly a mile from Eel Grass light vessel; N.W. $\frac{3}{4}$ N., $6\frac{1}{2}$ cables from Hawk's Nest point (at the foot of Choco mount), and E. $\frac{1}{2}$ S. distant $1\frac{1}{4}$ miles from North Dumpling lighthouse.

North Dumpling or **Hammock**, is the westernmost of the small islands, lying north of the western portion of Fisher island, and is conspicuously marked by its lighthouse. The north side of the island should not be approached nearer than three-quarters of a cable.

Directions for Watch hill channel.—When south, distant a quarter of a cable from Gangway rock red buoy, in $4\frac{3}{4}$ fathoms, steer W. $\frac{3}{4}$ N. with not less than 5 fathoms water, until about a mile westward of Ram island reef buoy, with Morgan point lighthouse bearing N. by E. $\frac{5}{8}$ E. distant one mile, and Bartlett reef light vessel W. $\frac{3}{4}$ S. Alter course for the latter on that bearing, which continued will lead to abreast the light vessel, with not less than $4\frac{1}{4}$ fathoms. These courses lead $1\frac{1}{2}$ cables south of Napatree point buoy, one cable north of Wicopesett reef, 3 cables south of Latimer reef beacon and buoy, $1\frac{1}{2}$ cables north of East Clump, a quarter of a mile southward of Ram island reef buoy, and 2 cables north-westward of North Dumpling lighthouse. If proceeding to New London the W. $\frac{3}{4}$ N. course may be continued, passing about $1\frac{1}{2}$ cables northward of Sea-flower reef beacon, until New London harbour lighthouse bears N. by W., when follow the directions hereafter given for that port.

ICE.—Except in severe winters Fisher island sound is not much obstructed by ice, but on these occasions the main body of the drift ice in Long island sound divides at Bartlett reef, the portion passing through Fisher island sound, completely closing navigation. Strong westerly winds and milder weather, however, soon liberate the channels but leaving the harbours effectually sealed.

TIDES AND TIDAL STREAMS in **Fisher island sound.**—It is high water, full and change, at Stonington at 9h. 5m.; springs rise 3 feet, neaps $2\frac{3}{4}$ feet.

In Watch hill channel, the flood or west stream, sets nearly in the direction of the channel, though with a slight tendency to the northward, the ebb or east stream shewing the same tendency to the southward.

Between Gangway rock and Sugar reef, the flood stream runs during the period of its maximum strength, W. by N. $\frac{1}{2}$ N., at the hourly rate of $1\frac{1}{4}$ knots, the ebb setting in a reverse direction, with the same velocity. Near Eel Grass light vessel the flood runs W. by S., and the ebb E. $\frac{1}{2}$ N., at the rate of $1\frac{1}{4}$ knots. North of Wicopesset reef, the direction of the flood and ebb streams, is N.W. $\frac{3}{4}$ W., and S.E. $\frac{3}{4}$ E., respectively, and velocity 2 knots per hour. Off Groton Long point, the flood and ebb run west, and E.S.E., with a velocity of $1\frac{1}{4}$ knots, and between Sea-flower, and Horse-shoe reefs, they set respectively W.N.W., and E.S.E. with an hourly rate of 2 knots.

LONG ISLAND SOUND.*—This extensive body of water is contained between the shores of Connecticut and New York on the north, and Long island on the south. Between Fisher and Plum islands (eastern entrance points) the sound is about 6 miles wide; and at its western extremity where it joins East river, between Throg's Neck and Willets point, is only three-quarters of a mile wide. Between its east and west extremities it is about 85 miles long, its greatest breadth near the middle being over 16 miles.

Long island sound is free from dangers throughout its entire length; affords ample room for working to windward, and good anchorage in adverse weather. The great drawback to its usefulness as a thoroughfare, between New York, and the Eastern States, is the well known, and much dreaded passage, of Hell Gate, in the Narrows of East river, where the velocity of the streams, and numerous sunken rocks, have long been very great obstructions to navigation.

Of late years, however, the increasing use of steam power, together with the removal of the most dangerous of the sunken ledges, have much diminished the dangers of this passage, and there is little doubt that in the not distant future, Long island sound will become the highway for all vessels bound from New York to the eastward.

Although there are a great many harbours, and anchorages, on both shores of Long island sound, suitable for coasters, there are few that can be confidently entered by strangers. Of these, New London on the north, and Huntington and Oyster bays, with Hempstead harbour on the south are the principal.

In the eastern entrance to Long island sound there are three passages, viz., the main channel between Race point and Little Gull island, known as

* See Admiralty charts:—Long island sound, Sheets 1 and 2, Nos. 2,754, 2,755, scale, $m=0.7$ of an inch.

The Race ; that between Great Gull and Plum islands, and Plum Gut between Plum island and Oyster point, but The Race is the only passage recommended to strangers.

LIGHTS on the north side of LONG ISLAND SOUND.—Bartlett reef light vessel lies in 11 fathoms water, half a mile southward of that reef, and $3\frac{1}{2}$ miles south-westward of the entrance to New London harbour. She is painted black, with a white streak, and the words *Bartlett reef* on each side, and exhibits two *fixed* white lights, elevated 28 feet above high water, visible 10 miles.

Fog signal.—In foggy weather a bell and horn are sounded.

Saybrook (Lynde Point).—This lighthouse is situated on the point of that name, the west entrance point of Connecticut river. It is painted white, 64 feet high, and attached to the keeper's dwelling of a drab colour, and exhibits, at an elevation of 73 feet above high water, a *fixed* white light, visible 14 miles, between the bearings of S. by E. (by west and north) to E. by N.

Fog signal.—In foggy weather a bell is sounded at intervals of *twelve seconds*.

Cornfield point light vessel moored in $7\frac{1}{2}$ fathoms water, about $1\frac{1}{4}$ cables south of the central portion of Long sand shoal, is sloop rigged, and painted red, with her name on each side, and exhibits a *fixed red* light from an elevation of 40 feet above high water, visible 12 miles.

Fog signal.—A bell and horn are sounded in foggy weather.

Falkner island lighthouse, erected on the island of that name, situated south of Guilford harbour, is a white stone tower, 46 feet high, attached to the keeper's dwelling, and exhibits, at 96 feet above high water, a *fixed* white light varied by a *white flash every minute and a half*, visible 15 miles.

Fog signal.—In foggy weather a whistle is sounded, giving blasts of *eight seconds* duration at intervals of *fifty-two seconds*.

South-west Ledge.—The lighthouse erected upon this ledge is situated in the entrance to New Haven harbour. It is coloured red and exhibits, at an elevation of 57 feet above high water, a *fixed* white light, visible 13 miles.

Fog signal.—A bell is sounded during foggy weather at intervals of *fifteen seconds*.

Stratford point lighthouse, erected on the west entrance point of Housantic river, is an octagonal tower, 33 feet high, painted with black and white vertical stripes, and exhibits, at 55 feet above high water, a *flashing white* light, the intervals between the flashes being *forty-five seconds*, visible 12 miles, between the bearings of S.W. (by west and north) to E. $\frac{1}{4}$ N.

Fog signal.—A bell is sounded in foggy weather, at intervals of *fifteen seconds*.

Penfield reef.—This lighthouse is attached to the keeper's one storey dwelling, situated on Penfield reef, 400 yards south of Fairfield Bar, near Black rock harbour. The dwelling is coloured gray and the light-tower white, and exhibits, at 54 feet above high water, a *flashing red* light, the intervals between the *red flashes* being *five seconds*, visible 12 miles, except between the bearings of South and East.

Fog signal.—In foggy weather a bell is sounded giving *two strokes* in *quick succession* every *twenty seconds*.

Norwalk Island.—The lighthouse near the west extreme of Sheffield island, the western of the Norwalk islands, surmounts the keeper's two storey dwelling, both built of gray granite. The tower is 46 feet above the ground, and exhibits, at 52 feet above high water, a *fixed* white light, varied by a *red flash every minute*, visible 12 miles, when bearing from W. by S. $\frac{1}{2}$ S. (round north) to E. by N. $\frac{1}{4}$ N.

Harbour Ledge.—This lighthouse is erected on the ledge of this name, at the entrance to Stamford harbour. The tower is of the shape of a truncated cone, coloured white and exhibits, at an elevation of 52 feet above high water, a *fixed red* light, visible from a distance of 13 miles.

Fog signal.—In foggy weather, a bell is sounded at intervals of *twenty seconds*.

Great Captain Island.—The lighthouse is erected on the western extreme of the island of that name, situated $2\frac{1}{4}$ miles westward of Greenwich point. The keeper's dwelling is built of granite, surmounting which is the light-tower, painted white, exhibiting, at 74 feet above high water, a *fixed* white light, visible 14 miles. From the eastward the light is not visible when bearing southward of W. by S.

Execution rocks.—This lighthouse is built on the highest of those rocks situated north-westward of Sands point. The tower is painted white, and attached to the keeper's two storey gray granite dwelling, exhibiting, at an elevation of 58 feet above high water, a *fixed* white light, visible 13 miles.

Fog signal.—In foggy weather a trumpet is sounded, giving blasts of *seven seconds* duration, at intervals of *forty-three seconds*. In case of accident to the trumpet, a fog horn will be sounded.

Throgg's Neck.—This lighthouse is situated 100 yards north-eastward of fort Schuyler, erected on the south-east point of Throg's Neck, and the north-west entrance point of East river. It is 61 feet high, and exhibits, at an elevation of 66 feet above high water, a *fixed* white light, visible 13 miles when bearing from S.S.W. $\frac{3}{4}$ W. (round west and north) to East.

Fog signal.—A bell is struck at intervals of *fifteen seconds* in foggy weather.

LIGHTS on the south side of LONG ISLAND SOUND.—**Plum island.**—This lighthouse is situated on the western extreme of the island of that name. The white tower rises from the keeper's dwelling, built of gray granite, and, at an elevation of 76 feet above high water, exhibits a *flashing white* light, the intervals between the flashes being *thirty seconds*; visible 14 miles except when obscured by Plum island, between the bearings of S.S.W. $\frac{1}{2}$ W., and N.W. $\frac{1}{2}$ N.

Fog signal.—In foggy weather, a bell is sounded at intervals of *fifteen seconds*.

Horton point lighthouse is built on the point of that name situated about 11 miles westward from Oyster point. It is a square tower attached to the keeper's dwelling, 35 feet high, and painted white. A *fixed white* light is exhibited at 103 feet above high water, and visible 16 miles. From the eastward the light is obscured when bearing west of S.W. by W.

Stratford Shoal (Middle Ground).—The lighthouse on Middle Ground is an octagonal tower attached to the south side of the keeper's dwelling, and, from an elevation of 63 feet above high water, exhibits a *flashing white* light, the intervals between the flashes being *ten seconds*, visible 13 miles. Both light-tower and dwelling are of gray colour.

Fog signal.—In foggy weather a trumpet is sounded giving blasts of *six seconds* duration at intervals of *twenty-one seconds*. A bell will be struck in case the trumpet should be disabled.

Old Field point lighthouse is situated on the north extremity of the point of that name, distant about 31 miles westward from Horton point lighthouse, and bearing S. by W. $\frac{3}{4}$ W., distant 5 miles from the lighthouse on Middle Ground. The lantern coloured black, attached to the gable of the keeper's white dwelling, is 46 feet high, and exhibits a *fixed white* light at an elevation of 79 feet above high water, visible seaward 14 miles between the bearings of West and E. by N. $\frac{1}{4}$ N.

Eaton Neck lighthouse, erected on Eaton point, the north extreme of Eaton Neck and the east entrance point of Huntington bay, is a white tower, 63 feet high, and exhibits, a *fixed* white light at an elevation of 147 feet above high water, which is visible seaward 18 miles, between the bearings of East and W.N.W.

Fog signal.—During thick or foggy weather a siren is sounded, giving blasts of *nine seconds* duration at intervals of *thirty-five seconds*.

Sands point.—This lighthouse stands on the point of that name, the north-western extreme of Manhasset Neck. The white tower, 46 feet

high, is attached to the keeper's dwelling, and exhibits, at an elevation of 68 feet above high water, a *flashing* white light, the flashes occurring *every half minute*, and visible 13 miles, when bearing from W.S.W. (round south and east) to N.E. $\frac{1}{2}$ N.

Stepping Stones.—This lighthouse is erected on the north-west of the reef of that name, north-eastward distant $1\frac{1}{4}$ miles from Throg's Neck. The lantern surmounts the red brick dwelling, and exhibits from an elevation of 49 feet above high water, a *fixed red* light, visible 12 miles. From the north-eastward, the light is obscured when bearing west of S.W. by W.

Fog signal.—In foggy weather, a bell is sounded at intervals of *twenty seconds*.

DANGERS in THE RACE.—**Valiant rock** lies in about the middle of The Race, and has but 17 feet water over it; from this rock Morgan point (Mystic) lighthouse is seen, just open north-westward of Fisher island bearing N.E. $\frac{1}{2}$ N.; Little Gull island lighthouse, just open southward of Great Gull island S.W. by W. $\frac{3}{4}$ W.; and the point of Fisher island near mount Prospect, in line with the south-east or most distant visible point of Fisher island, E. by N. $\frac{3}{4}$ N.

A nun buoy, painted red and black in horizontal stripes, is placed south-west of the rock, but the velocity of the streams being ordinarily from 3 to 5 knots per hour, the position of the buoy must not be too implicitly relied upon. Vessels may pass on either side of Valiant rock, but it is usual to pass on the south-west side.

Little Gull island reef extends $1\frac{1}{2}$ cables eastward from that island. It is dry at low water, and near its east extremity, is placed a black nun buoy, which bears E. by N., distant 2 cables from Little Gull island lighthouse.

OUTER DANGERS on the NORTH SIDE OF LONG ISLAND SOUND.—**Bartlett reef**, dry at low water, in several places extends in a S. by E., and N. by W. direction $1\frac{1}{2}$ miles. Its northern extremity is marked by a black spar buoy, placed as a guide for Two Tree island channel, bearing W. $\frac{1}{2}$ S., $1\frac{1}{4}$ miles from Goshen point. Near its southern extreme is placed a red spar buoy bearing S.W. $\frac{1}{2}$ S., distant $1\frac{3}{4}$ miles from the same point, and 4 cables northward of the light vessel already described. Between the latter, and the red buoy, is a clear channel with not less than 7 fathoms water.

Saybrook Bar extends $1\frac{1}{2}$ miles southward from New Breach point, the eastern entrance point of Connecticut river. It has from 4 to 9 feet water over the southern portion, and its south extremity is marked by a

red can buoy, placed in 3 fathoms, bearing E. by N. $\frac{1}{4}$ N., distant $3\frac{3}{4}$ miles from Cornfield point light vessel, and W. by S., distant $2\frac{1}{2}$ miles from Hatchett reef buoy, marking the east extreme of this shoal ground.

Long Sand shoal, situated southward of Cornfield point, is $5\frac{1}{2}$ miles long in an east and west direction, with a maximum width of a quarter of a mile: there are depths varying from 7 to 16 feet over this shoal.

The central portion is prominently marked by Cornfield point light vessel, previously alluded to, in the description of lights.

Its western extremity is marked by a red and black horizontally striped nun buoy, bearing W. by N. $2\frac{1}{2}$ miles distant from the light vessel.

The Eastern extreme bears S. by E. $\frac{3}{4}$ E., distant 2 miles from Saybrook lighthouse, and S.W. $\frac{1}{4}$ W., $6\frac{1}{2}$ cables from Saybrook Bar buoy, which is here the width of what is known as North channel of Long island sound.

At night to avoid all shoal water between Bartlett reef, and Cornfield point light vessels, the former should not be brought to bear east of E. $\frac{1}{4}$ N., nor the latter south of W. $\frac{1}{4}$ S., and to pass south of the western portion of Long Sand shoal, Falkner island light should not be brought to bear westward of W. $\frac{3}{4}$ N.

Kimberley reef, with 10 feet water over it, lies E. $\frac{1}{4}$ N., distant $1\frac{4}{10}$ miles from Falkner island lighthouse. It is marked by a red and black horizontally striped spar buoy, placed in 15 feet water on the north of the reef.

Strangers should not stand northward of Falkner island lighthouse, bearing W. $\frac{1}{2}$ N., or Cornfield point light vessel bearing E. $\frac{1}{2}$ S., to avoid all the shoal water between them. Goose island, open south of Falkner island, leads south of Kimberley reef.

Goose island lies W. $\frac{1}{2}$ S., 9 cables from Falkner island lighthouse, and its south side should be given a berth of half a mile.

Branford reef, is a detached shoal dry at low water upon which is erected a conspicuous gray coloured stone beacon, bearing W. by N. $\frac{1}{4}$ N., nearly 7 miles distant from Falkner island lighthouse, and W. by S. $\frac{3}{4}$ S., $2\frac{4}{10}$ miles from Outer Thimble. In standing to the northward, Brandford reef and all the shoal water between it and Goose island, will be avoided by not bringing Falkner island lighthouse to bear south of E. $\frac{3}{4}$ S.

New shoal with 3 fathoms water on it lies W. $\frac{1}{2}$ S., distant $2\frac{3}{4}$ miles, from Branford reef beacon, and is marked by a red and black horizontally striped buoy.

Stratford point shoal extends to the depth of 3 fathoms, southward $1\frac{1}{4}$ miles from the point of that name. The southernmost shoal rock

with 9 feet water over it lies one mile from the shore and is marked by a red spar buoy placed on its south side in 15 feet water bearing, S.W. $\frac{1}{2}$ W. $1\frac{6}{10}$ miles distant from Stratford point lighthouse. To ensure being south of this shoal at night, Penfield reef lighthouse should not be brought to bear west of W. $\frac{1}{4}$ N.

George rock, awash at low water, is situated E. by S. $\frac{1}{2}$ S., distant $1\frac{1}{4}$ miles from the eastern extreme of Cockenoes (pronounced Cawkins) island, the easternmost of the Norwalk group.

The shoals which surround Norwalk islands are very extensive, and dangerous.

A rock with 9 feet over it, lies S.E. by E. $\frac{1}{4}$ E., $1\frac{1}{4}$ miles distant from the same island, and is marked with a red can buoy, bearing W. by S. $\frac{1}{2}$ S., distant $5\frac{4}{10}$ miles from Penfield reef lighthouse, and E. by N. $\frac{3}{8}$ N., $4\frac{1}{2}$ miles from Norwalk island lighthouse.

Green ledge, dry in places, extends W. by S. $\frac{1}{2}$ S., $1\frac{1}{2}$ miles from the west extreme of Sheffield island, the westernmost of the Norwalk group. It is marked by a red can buoy, placed close to the west side of a rock with 8 feet water, bearing W. by S. $\frac{1}{2}$ S., $1\frac{1}{10}$ miles from Norwalk island lighthouse, but vessels proceeding to Sheffield harbour, and drawing over 16 feet of water should pass a quarter of a mile west of this buoy.

Great reef extends southward from the west extreme of Sheffield island, and has erected upon its south extreme, a wooden beacon, surmounted by a cage, bearing S.S.W. $\frac{3}{4}$ W., $3\frac{1}{2}$ cables distant from Norwalk island lighthouse. To pass south of Norwalk islands, and adjacent shoals, a vessel should not stand less into than 5 fathoms, nor bring Penfield reef lighthouse to bear east of E.N.E.

The Cows, dry at low water, are situated South, distant three-quarters of a mile from Shippian point, and are marked by a red can buoy, placed in 12 feet on their southern side, bearing W. by S. $\frac{3}{4}$ S., $5\frac{1}{4}$ miles distant from Norwalk island lighthouse, and E. $\frac{3}{4}$ N., distant $4\frac{3}{4}$ miles from the lighthouse on Great Captains island.

To avoid The Cows and all shoal water between them and Green ledge, Norwalk island light should not be brought to bear east of N.E. by E. $\frac{3}{4}$ E.; and when between The Cows and Great Captain island lighthouse, the latter should not be brought to bear south of W. $\frac{1}{2}$ S.

Whortleberry island is situated nearly a mile N.W. from the lighthouse on Execution rocks. To avoid the shoals on the north-west side of Long island sound, between this island and Great Captain island lighthouse, the latter should not be brought to bear east of N.E. $\frac{3}{4}$ E.

Execution rocks, with a lighthouse on them, are a group, some of which dry at low water, extending about three-quarters of a mile N.N.E. and S.S.W. The main channel lies between them and Sands point on the southern shore, but with scant winds, or a strong ebb stream, vessels sometimes pass north-west of Execution rocks. A red and black horizontally striped spar buoy marks the north-east extreme of the shoal surrounding Execution rocks, and bears N. $\frac{1}{2}$ W., $1\frac{1}{2}$ miles distant from Sands point lighthouse, a red spar buoy is moored on its east side, with Sands point lighthouse, bearing S. by E. $\frac{1}{2}$ E., and a red spar buoy in 3 fathoms, near the south-west extremity, bearing S.W. $\frac{1}{2}$ W. from Execution rocks lighthouse.

City island shoal, with 4 to 9 feet water over it, lies at the mouth of Hutchinson river. Its eastern edge extends from Throg's Neck lighthouse, to the south extreme of City island, situated west of the anchorage under Hart island. A red spar buoy is placed near a dry rock known as Big Tom, bearing N. by E., distant $1\frac{1}{2}$ miles from Throg's Neck lighthouse. To pass east of City island shoal, the latter lighthouse should not be brought to bear south of S.S.W. $\frac{1}{2}$ W.

OUTER DANGERS on the SOUTH SIDE OF LONG ISLAND SOUND.—**Two rocks** with 6 and 9 feet water on them, lie half, and three-quarters of a cable respectively, northward of the central portion of the north coast of Plum island. They are not buoyed, but may be avoided, by not bringing Little Gull island lighthouse to bear northward of East.

Caution.—The north shores of Gull, and Plum islands, should not be approached nearer than half a mile, to avoid the influence of the ebb stream through Plum Gut, and the passage between Gull and Plum islands.

Orient shoal, with 6 feet least water over it, lies between Terry and Rocky points, and is marked by a black spar buoy placed E.N.E., distant $1\frac{1}{2}$ cables from the shoalest part, with Plum island lighthouse bearing E. $\frac{1}{2}$ N. open a little northward of Mulford point. To pass north of this shoal, do not bring Plum island lighthouse to bear north of E. $\frac{1}{2}$ N. nor stand into less than 12 fathoms.

Roanoke point shoal, extends northward $1\frac{1}{2}$ miles from this point; it has 6 feet least water and its northern extremity is marked by a black spar buoy placed in 3 fathoms, bearing W. by S. (southerly) from Horton point lighthouse. In standing to the southward, this lighthouse should not be brought to bear north of E. $\frac{1}{2}$ N., which leads north of Roanoke point shoal and also the shoal water extending off Goldsmith inlet between Horton and Duck Pond points.

Herod point shoal, extends northward $1\frac{3}{4}$ miles from the point of that name, at $1\frac{1}{2}$ miles N.N.E from this point the depth on the shoal

is only 6 feet, which is marked by a black spar buoy placed in 3 fathoms water. This buoy should not be approached too closely, as there is only a depth of 14 feet N.W. by W. $\frac{1}{4}$ W., half a mile from it.

At night, a vessel should not stand into less water than 17 fathoms between Friar head and Old Field point, by which, all the shoals between them will be avoided.

Rocky point shoals, is the name given to a shoal bank, fronting the shore included between Rocky point, and Miller's Landing. The depth over it is 10 feet at three-quarters of a mile from the shore, with many sunken and dry rocks at low water closer in shore. It is not buoyed, but may be avoided by not approaching the coast in the vicinity closer than 2 miles, nor to a less depth than 17 fathoms as mentioned above.

Mount Misery shoal, with 6 feet water, is $3\frac{1}{4}$ cables long in an E.N.E., and W.S.W. direction, and is situated three-quarters of a mile northward from Mount Misery point, with a passage of 13 feet water between them. The eastern extreme of the shoal is marked by a black spar buoy, placed in 14 feet water, bearing E. $\frac{3}{4}$ N. $1\frac{7}{10}$ miles distant from Old Field point lighthouse.

The Middle Ground, or Stratford shoal, as it is sometimes termed, lies almost exactly midway between the north and south shores of Long island sound, and is well marked by the lighthouse previously described. It is $4\frac{1}{4}$ cables long in a N. $\frac{1}{2}$ E. and S. $\frac{1}{2}$ W. direction, and $1\frac{1}{2}$ cables wide, with depths over it varying from 2 to 15 feet. The lighthouse on it bears N. by E. $\frac{1}{2}$ E., distant 5 miles from Old Field lighthouse, and S. $\frac{3}{4}$ W. $5\frac{4}{10}$ miles from Stratford point lighthouse.

Eaton point shoal extends 9 cables northward from Eaton point. At half a mile N.E. from Eaton point lighthouse, there are depths varying from 2 to 6 feet, and near this position, is placed a black spar buoy, marked No. 13.

A shoal with 19 feet water on it, lies N. by W. $\frac{1}{8}$ W., distant $1\frac{2}{3}$ miles, from Eaton point lighthouse, and a patch with 21 feet least water over it, lies N. by E. $2\frac{1}{8}$ miles distant from the same.

Lloyd point shoal, with 14 feet water, extends 4 cables northward from Lloyd point, the eastern entrance point of Oyster bay. A black spar buoy placed in 3 fathoms, marks its north extremity, which may be avoided when standing to the southward, by not shoaling to less than 9 fathoms, or not bringing Eaton point lighthouse to bear east of E. by S.

Centre island reef, dry in some parts, extends one mile northward from Centre island point, the western entrance point of Oyster bay. A

black spar buoy is placed on its north-west side, bearing S.W. by $\frac{1}{2}$ W., distant $2\frac{1}{2}$ miles from Lloyd point shoal buoy. Shoal water to the depth of 17 feet, is found 4 cables north-eastward of the buoy.

Shoal water extends a quarter of a mile northward of Matinicock point, marked by a black spar buoy placed in 3 fathoms. To pass north of this shoal and all the shoal water between it and Centre island point, Execution rocks lighthouse should not be brought to bear west of W. by S. $\frac{1}{4}$ S.

Prospect point shoal extends north-westward $4\frac{1}{2}$ cables from this point. The depth, at $3\frac{1}{4}$ cables from the shore, is 10 feet, and a rock awash at low water, named Old Hen, lies N. $\frac{3}{4}$ E., distant $1\frac{1}{4}$ cables, from Prospect point.

Sands point reef, with 2 to 9 feet water upon it extends over 3 cables north-westward from the point of that name. In $3\frac{1}{2}$ fathoms, on its north-west side, is moored a black spar buoy, bearing N.W. $\frac{1}{2}$ N., distant $3\frac{1}{2}$ cables, from Sands point lighthouse. To pass north-west of this shoal, Throg's Neck lighthouse should not be brought to bear west of S.W. $\frac{1}{4}$ S.

Gangway rock lies about 6 cables N.W. by N. from Barker point; it has 6 feet water over it and is marked by a black spar buoy. In the same direction $3\frac{3}{4}$ cables distant from the same point is Success rock, awash at low water, on which is erected a red painted beacon. Execution rocks lighthouse bearing N.E. by N., leads north-westward of these rocks.

Hewlett Point reef extends $1\frac{3}{4}$ cables northward from the south-west entrance point of Manhasset bay. It is dry in places and has but 9 feet water over it at the distance of $1\frac{1}{2}$ cables from the point.

Stepping Stones, is the name given to a group of rocks, some of which are awash at low water, forming the north-west extremity of a long reef extending from Elm point N.W. $\frac{1}{2}$ N., three-quarters of a mile. On it is erected the lighthouse of that name a description of which is already given.

The western edge of the shoal water in Little Neck bay, extends almost to the line joining Stepping Stones and Willets point.

TORPEDOES.—On the walls of a granite fortification on Willets point, is the following notice. *Torpedoes in channel; do not anchor.*

Directions for Long Island Sound.—Main channel.—The course for The Race by the channel north of Block island, leads 3 cables, and that by the channel between Block island and Montauk point, three-quarters of a mile south of Valiant rock. Having passed south of the latter, and Little Gull island lighthouse bears

S.W. by W. $\frac{1}{4}$ W., distant about one mile, the course through Long island sound north of Middle Ground is West, leading $2\frac{6}{10}$ miles, and $3\frac{6}{10}$ miles, south of Long Sand shoal, and Falkner island lighthouse respectively, and 2 miles northward of Middle Ground lighthouse, until Penfield reef lighthouse bears N.N.E. $\frac{1}{2}$ E., a little over 2 miles distant. The course from this position is W. by S. $\frac{1}{2}$ S. until Sands point lighthouse bears S.S.E. (easterly), distant half a mile, and the lighthouse on Execution rocks N. $\frac{3}{4}$ W., $3\frac{1}{2}$ cables, whence steer, S.W., passing $1\frac{1}{2}$ cables north-westward of Gangway rock buoy, until abreast of the south extreme of City island, and Stepping Stones lighthouse bears S. $\frac{1}{2}$ W., distant $4\frac{1}{2}$ cables. The course is now altered to S.S.W. $\frac{1}{2}$ W., passing $1\frac{1}{4}$ cables westward of Stepping Stones lighthouse, until abreast the red buoy, marking the south extremity of the shoal water from Throg's Neck, at the entrance to East river, whence it is necessary to take a pilot, through Hell gate to New York.*

The least water on the above courses is $6\frac{1}{2}$ fathoms.

From Fisher island sound, continue the W. $\frac{1}{4}$ S. course, given in the directions for Watch hill channel, passing half a mile south of Bartlett reef, and $1\frac{1}{2}$ miles southward of Long sand shoal, until south of Hammonasset point; with Falkner island lighthouse bearing N.W. distant 5 miles, and Horton point lighthouse S.E. $\frac{1}{4}$ S. nearly 7 miles. From this position steer west, and proceed as above directed.

NEW LONDON HARBOUR.† is the easternmost harbour on the north shore of Long island sound, being formed by the mouth of Thames river. Its east and west entrance points are Avery and Lighthouse points respectively, distant a little more than a mile from each other. The river is navigable by those locally acquainted, for 15 miles to the city of Norwich, but strangers should not proceed beyond the town of New London, situated $2\frac{1}{2}$ miles from the entrance.

Groton monument, erected near the village of Groton, on the eastern side of the harbour, is the most conspicuous object seen in approaching, and entering the harbour. The entrance may be approached by Main and Pine island channels, but the former with 4 fathoms water is recommended to strangers. Good anchorage and shelter, may be obtained abreast the town of New London, in 4 to 10 fathoms, soft bottom.

On the west bank of the river, and $2\frac{1}{2}$ miles northward of New London, is situated the United States naval station.

LIGHT.—New London Harbour.—This lighthouse, is situated on Lighthouse point, the west entrance point of New London harbour.

* See Admiralty plan:—Hell gate, and approaches, No. 2,886; scale, $m = 14\cdot 3$ inches.

† See Admiralty plan:—New London and Connecticut river, No. 2,471; scale, $m = 8\cdot 5$ inches.

It is a white tower, 85 feet high from the base to the centre of lantern, attached to the keeper's dwelling, painted drab colour, and exhibits, at 90 feet above high water, a *fixed* white light, visible 15 miles.

Fog signal.—A trumpet is sounded during foggy weather, giving blasts of *six seconds* duration at intervals of *fourteen seconds*.

DANGERS on east side of MAIN CHANNEL.—
Black or South-east ledge with 2 feet least water over it is 3 cables long N.E. and S.W., and $1\frac{1}{4}$ cables wide. Its north-east extreme, is marked by a black beacon, bearing S.E. $\frac{1}{2}$ E., distant $1\frac{1}{10}$ miles from New London lighthouse, and a red can buoy is placed in 3 fathoms, near the south-west extreme, bearing S.E. $\frac{1}{2}$ S. $1\frac{1}{10}$ miles from the same lighthouse.

South - west ledge, an isolated shoal with 7 feet water, lies nearly 2 cables westward of Black ledge, and is marked by a red and black horizontally striped buoy, placed in 2 fathoms on its west side, bearing S.E. by S. distant 9 cables from New London lighthouse.

Frank ledge, with 13 feet water, lies half a mile westward from Avery point. A spar buoy painted with red and black, with horizontal stripes, is placed on the rock, with Groton Monument bearing N. $\frac{1}{2}$ E. in line with the hollow in Hobs island, and New London lighthouse, bearing N.W. by W. distant three-quarters of a mile.

Between the villages of Avery and Groton, vessels of heavy draught should not approach the shore nearer than $1\frac{1}{2}$ cables.

DANGERS on west side of MAIN CHANNEL.—
Rapid rock with 10 feet water, is the south-east termination of a shoal, with less than 3 fathoms water, extending from Goshen reef. The rock is marked by a red and black horizontally striped buoy, placed close to its south-east side and bearing N.E. $\frac{3}{4}$ E., distant $1\frac{6}{10}$ miles, from Bartlett reef light vessel.

Goshen reef has 7 feet least water, and lies with its south-east extreme bearing S.S.E. $\frac{1}{2}$ E., 6 cables from Goshen point, and here is placed a black spar buoy.

Cormorant rock ledge, is situated E. $\frac{3}{4}$ S., distant nearly three-quarters of a mile from Goshen point, and one cable eastward of Cormorant rock above high water. The ledge has 8 feet water on it, and its east edge is marked by a black spar buoy, bearing S.S.W. $\frac{1}{4}$ W., one mile distant from New London lighthouse.

The above rocks, and the extensive bank on which they lie, are all avoided by keeping Groton Monument, in line with New London lighthouse, bearing N. by E. $\frac{3}{4}$ E.

Mercer or Sarah rock is a detached rock with 14 feet water, lying E. by S. $\frac{3}{4}$ S., one mile distant from Goshen point. It is marked by a red and black horizontally striped buoy, placed in 3 fathoms on its western side, bearing S. by W. (westerly) distant $1\frac{1}{4}$ miles from New London lighthouse. The clearing mark alluded to above, leads west of Mercer rock.

Quinnipeag rocks, situated $1\frac{3}{4}$ cables north-eastward of New London lighthouse, are avoided, as well as the shoal water extending eastward from them, by not approaching the shore in their vicinity nearer than 2 cables.

A rock with 11 feet water over it, lies S. $\frac{3}{4}$ W. $2\frac{1}{4}$ cables distant from New London lighthouse; to pass east of which, the latter should not be brought to bear eastward of north.

Hog's Back, awash at low water, lies S. by W. distant 2 cables from Powder island, the easternmost of two small islands situated southward of Fort point.

White rock, above high water, lies half a cable north-eastward of Hog's back.

Melton ledge, awash at low water, lies a cable eastward of Powder island. A black spar buoy is placed on its south-east side, bearing S. $\frac{3}{4}$ E., 3 cables distant from the eastern extremity of Fort point.

The depth of 3 fathoms will be found three-quarters of a cable eastward of Melton ledge, from which position the eastern edge of the 3-fathom bank extends almost in a straight line for Winthrop point, situated about one mile northward of Fort point. Winthrop point, bearing N. $\frac{1}{2}$ E., leads eastward of this bank and also the shoal water in Green harbour.

Directions by Main channel.—If from Block island sound, when near The Race, with Little Gull island lighthouse bearing W. $\frac{1}{2}$ S., 3 miles, and Race rock lighthouse North, $1\frac{1}{2}$ miles steer, N. by W. for New London lighthouse, passing nearly a mile north-eastward of Valiant rock, and a third of a mile south-westward of Race rock lighthouse.

When Bartlett reef light vessel bears S.W. by W. $\frac{3}{8}$ W., North Dumpling lighthouse E. by S. $\frac{3}{4}$ S., and Groton Monument N. $\frac{3}{4}$ E., steer N. $\frac{1}{4}$ E., which will lead with not less than 4 fathoms to the anchorage off New London, passing half a mile eastward of Mercer rock buoy, about 2 cables westward of the buoy on South-west ledge, and 3 cables westward of Frank ledge.

If from Fisher island sound, continue the W. $\frac{3}{4}$ N. course, passing $1\frac{1}{2}$ cables north of Sea-flower beacon, and $4\frac{1}{2}$ cables southward of the buoy on

South-west ledge. When New London lighthouse bears N. by W., steer N. $\frac{1}{4}$ E., and proceed as above directed.

From the westward, steer N.E. by E. $\frac{1}{4}$ E. from Bartlett reef light vessel, passing a quarter of a mile southward of the buoys marking Rapid, and Mercer rocks. When the harbour is well open and the lighthouse bears N. $\frac{1}{4}$ E., and North Dumpling lighthouse E. by S. $\frac{1}{4}$ S., steer N. by E. $\frac{1}{2}$ E. until abreast Ocean house, a conspicuous hotel, situated a quarter of a mile northward of Hobs island, on the eastern shore; passing a quarter of a mile eastward of Mercer rock, 4 cables westward of South-west and Frank ledges, and a cable eastward of the shoal water extending eastward from Quinnipeag rocks. When New London lighthouse bears S.W. $\frac{5}{8}$ S. and Fort point N. $\frac{3}{4}$ W. (westerly), steer N. $\frac{1}{4}$ E. for Winthrop point which will lead, with not less than 4 fathoms, to the anchorage off the town of New London.

ICE.—Drift ice, in severe winters, forms a dangerous obstruction in approaching New London Harbour from Long island sound during the months of January, February, and March. On those occasions the ice extends $1\frac{1}{2}$ miles northward of New London lighthouse, and although the buoys are seldom disturbed, Bartlett reef light vessel is sometimes driven from her position, and may remain so for several days. In ordinary winters Thames river is clear of ice northward of the lighthouse.

Tides and tidal streams.—It is high water, full and change, in New London harbour, at 9h. 28m.; springs rise 3 feet, neaps $2\frac{1}{2}$ feet.

Near Bartlett reef light vessel the flood or west stream turns to ebb at 2 hours before the moon's transit. During the second and third quarters the flood stream runs W. by N., with an hourly velocity of $1\frac{3}{4}$ knots; the ebb stream setting E. $\frac{1}{4}$ S. at the rate of $1\frac{1}{2}$ knots. At $1\frac{1}{2}$ miles S. by E. $\frac{1}{2}$ E. from New London lighthouse the flood at the same period sets W. $\frac{1}{2}$ N. with an hourly velocity of one knot, turns to ebb 1h. 43m. before the moon's transit, and runs E.N.E. at the same rate.

Vessels after passing the lighthouse are often embarrassed in light winds, and after rains, by a strong surface current setting out on the flood tide.

BLACK ROCK HARBOUR.*—This and the adjoining harbour of Bridgeport, on the north side of Long island sound, are suitable only for vessels of very light draught. Bridgeport is a thriving town, celebrated for its manufactures, but can only be approached by an artificial channel with the depth of 12 feet and width of 33 yards. Black rock harbour,

* See Admiralty plan :—Black rock, Bridgeport, and New Haven harbours, No. 2,479; scales, m = 2·4 and 3·4 inches.

though shallow, has no isolated dangers as far as the usual anchorage in 10 to 12 feet.

Deeper water, however, and good shelter from all but easterly and south-east winds may be obtained south of the entrance to Black rock harbour in 16 to 18 feet at low water, protected by Fairfield Bar.

LIGHTS.—Black Rock.—This lighthouse is erected on the south-west part of Fairweather island, the east entrance point of Black Rock harbour. It is a white tower, 33 feet high, which exhibits, at 39 feet above high water, a *fixed* white light, visible 11 miles, except between the bearings of W.S.W. and South.

Bridgeport harbour lighthouse is situated on the south-east extreme of the long shoal, extending south-eastward from Park point, the west entrance point of Bridgeport harbour, and about one mile southward of the town. It is an iron pile structure, painted white, which exhibits, at 52 feet above high water, a *fixed red* light, visible 12 miles. From the westward this light is not visible when bearing east of N.E.

Fog signal.—A bell is sounded in foggy weather every *fifteen seconds*.

DANGERS.—Stratford point shoal has already been described (*see page 110*).

Shoal water extends a long distance from the shore between Stratford point and Fairweather island, there being not more than 3 fathoms nearly three quarters of a mile southward of Bridgeport harbour lighthouse. From this position the edge of the 3-fathom bank runs almost straight to Fairweather island, the eastern side of which is tolerably bold.

Point rock shoal is the name given to the southern portion of the shoal water extending southward from the south point of Fairweather island. A red spar buoy is placed in 2 fathoms, bearing S. $\frac{3}{4}$ W., distant 3 cables, from Black rock lighthouse. Northward, a cable from this buoy, is Point rock, awash at low water, lying at the south extreme of the dry portion of the shoal.

Fairfield Bar, which shelters the outer anchorage, is a very narrow sand spit, a little more than a mile in length, extending in a S.E. by E. $\frac{1}{2}$ E. direction from Shoal point. Between Shoal point and Black rock harbour there is not more than 12 feet at an average distance of half a mile from that shore.

Black or Huncher rock lies about 1 $\frac{1}{4}$ cables eastward of the east extreme of Fairfield Bar, and has erected upon it a red beacon bearing N.E. $\frac{1}{2}$ E., distant a quarter of a mile from Penfield reef lighthouse.

The Cows are a group of rocks, some of which dry at low water situated $1\frac{1}{4}$ cables north-eastward of the eastern extreme of Fairfield Bar.

At night, to pass east of these shoals, Black rock lighthouse should not be brought to bear north of N. $\frac{1}{4}$ W., and to pass south of the shoal water extending south-westward from Penfield reef lighthouse, Norwalk island light should not be brought to bear southward of W. by S.

Directions.—From the eastward.—When abreast the red buoy on Stratford point shoal, with the lighthouse on that point bearing N.E. $\frac{1}{2}$ N., distant 2 miles, and Black rock lighthouse bearing N.W. by W. $\frac{3}{4}$ W., steer W. by N. $\frac{1}{4}$ N., which will lead about midway between The Cows and the red buoy on Point rock shoal. When Black rock lighthouse bears N.E. $\frac{1}{2}$ N. anchor in 16 to 18 feet water under Fairfield Bar.

Small vessels wishing to enter Black rock harbour may, when on the W. by N. $\frac{1}{4}$ N. course with Black rock lighthouse bearing N. $\frac{5}{8}$ E., steer N. by W. for the entrance until the latter lighthouse bears E. by N., distant 2 cables. The course is now N. by E. $\frac{3}{4}$ E. carrying not less than 10 feet until the same lighthouse bears between S.E. and S. by E. $\frac{1}{4}$ E. which marks the anchorage in 10 to 12 feet.

From the westward.—On the Main channel course of E. by N. $\frac{7}{8}$ N. through the sound, when Penfield reef lighthouse bears N.N.E. $\frac{5}{8}$ E., distant $2\frac{1}{2}$ miles, and Bridgeport harbour lighthouse N.E. $\frac{1}{2}$ N., steer for the latter until the former bears W. by N., distant half a mile. From this position steer N. by W. for the east foot of Grovers hill (over the western entrance point) until midway between Penfield reef, and Black rock lighthouses, with the latter bearing N. $\frac{5}{8}$ E., whence either proceed W. by N. $\frac{1}{4}$ N. for the outer anchorage, or continue the N. by W., if of light draught, for the harbour as before directed.

Tides.—It is high water, full and change, at Bridgeport, at 11h. 11m. springs rise 8 feet, neaps $6\frac{1}{2}$ feet.

LITTLE CAPTAINS ISLAND HARBOUR.—This convenient anchorage, is situated on the north side of the island of that name, on the north side, and about 15 miles from the western boundary of Long island sound. It is entered from the south-eastward, between Little Captains island and the southern shore of Greenwich Neck, the east and west extremes of which are known as Greenwich and Flat Neck points respectively, the latter being recognisable from a grove of trees, the remainder of Greenwich Neck being bare.

Little Captains island, consists of two small islets, connected at low water by a sandy beach, the whole surrounded by rocks either awash, or

with very little water, over them. This island lies 6 cables north-eastward from Great Captains island, on which is erected the lighthouse.

The harbour affords shelter from all winds in 4 fathoms, and is easily accessible by following the directions.

DANGERS.—**Greenwich point shoal** is a dangerous ledge of rocks, sunken and awash, extending S.E. by E., 3 cables from the point of that name.

Woolsey rock, awash at low water, lies near the eastern edge of this shoal, bearing S.E. by E. $\frac{3}{4}$ E., distant a quarter of a mile from Greenwich point, and W. $\frac{1}{4}$ S., nearly 2 miles from the red buoy on The Cows. Neither rock or shoal are buoyed, and to pass south of them, and all the shoal water extending from the south shore of Greenwich Neck, vessels should not bring Great Captains lighthouse to bear south of W. $\frac{1}{2}$ S.

Flat Neck point shoal, dry in places, extends westward from that point, a quarter of a mile, at which distance there is 6 feet water. A red spar buoy is placed in 15 feet, about a cable west of the shoal, bearing W. by S. (southerly), distant $3\frac{3}{4}$ cables from Flat Neck point, and N.E. by E. $\frac{1}{2}$ E., from the lighthouse on Great Captain island.

Little Captains island east reef, extends north-eastward, and eastward from the eastern part of this island, being composed of rocks awash, and others with 2 to 3 feet water over them.

A black spar buoy is placed in 12 feet water, bearing E. by N. $\frac{1}{2}$ N. distant nearly half a mile, from the east extreme of Little Captains island and S.W. by W. $\frac{1}{2}$ W., 9 cables, from Flat Neck point.

Between this buoy, and that on Flat Neck point shoal, the channel is half a mile wide, with a depth of from 3 to 6 fathoms.

Directions for entering Little Captains island harbour.—On the W. by S. $\frac{7}{8}$ S. course through the sound, when the lighthouse on Great Captains island bears W.N.W., Eaton's Neck lighthouse E. by S. $\frac{1}{4}$ S., and the trees on Flat Neck point N.W. $\frac{1}{4}$ N., steer N.W. $\frac{1}{2}$ W., which course will lead to about midway between the two buoys at the entrance. When Great Captains island lighthouse bears S.W. $\frac{1}{2}$ W. anchorage may be obtained in 5 fathoms, or the course may be altered to W. by S., and continued until the same lighthouse bears S.W. $\frac{3}{4}$ S. where a vessel can anchor in from 3 to 4 fathoms.

Tides.—It is high water, full and change, in Little Captains island harbour, at 11h. 1m.; springs rise $8\frac{1}{4}$ feet, neaps $7\frac{1}{2}$ feet.

SMITHSTOWN BAY, is the name given to the eastern portion of the curve in the south shore of the sound, contained between Eaton and Crane Neck points, and during easterly gales, good anchorage may be obtained westward of the latter in $3\frac{1}{2}$ to 8 fathoms.

Crane Neck point, is a conspicuous bluff with yellow sand cliffs elevated from 60 to 120 feet.

Directions.—No further directions are necessary for this anchorage than to give Crane Neck point a berth of half a mile, and not to approach the southern shore nearer than a mile, to avoid the shoal water known as East and West Flats extending more than half a mile therefrom.

HUNTINGTON BAY.*—Entered between Eaton point on the east, and Lloyd Neck on the west, is the easternmost harbour on the south shore of Long island sound, and affords good anchorage, in 3 to 6 fathoms, half a mile northward of East Neck (the south shore of the bay) sheltered from all but northerly winds. Its south-east side is connected with Northport bay by a channel half a cable wide, and $3\frac{1}{2}$ fathoms deep, with the assistance of a pilot, shelter may be obtained in Northport bay in 4 to 9 fathoms water. Huntington, and Lloyd harbours are shallow and situated on the western side of the bay, only 8 feet water can be carried into the former and 12 feet into the latter.

LIGHT.—**Lloyd harbour.**—This lighthouse, situated on the south extremity of East beach, is a square tower attached to the keeper's dwelling both being painted white, 34 feet high, and exhibits a *fixed red light*, at 40 feet above high water, visible 11 miles.

DANGERS.—**East Beach flats**, extend $4\frac{1}{4}$ cables eastward from this beach, having only 5 feet water over them, a quarter of a mile from the shore. To avoid them do not stand into less than 4 fathoms water.

Rocks awash extend one cable north-eastward from East fort point, the eastern extreme of Lloyd Neck.

A shoal of 17 feet lies E. $\frac{1}{2}$ S., distant 7 cables from Lloyd harbour lighthouse, and 2 cables south-eastward of this shoal is the depth of 15 feet, being the north extremity of a bank extending northward, rather more than half a mile, from the south shore of the bay.

The east shore of the bay, should not be approached nearer than a quarter of a mile, when south of the line of East fort, bearing W.S.W.

Directions.—**From the eastward.**—When on the W. by S. $\frac{7}{8}$ S. course through Main channel of Long island sound, and Eaton Neck lighthouse, bears S. $\frac{1}{4}$ E. distant $3\frac{1}{4}$ miles, steer S. by W. $\frac{1}{4}$ W. into Huntington bay, which will lead with not less than $3\frac{1}{2}$ fathoms, to the usual anchorage a little less than half a mile northward of Eaton Neck.

* See Admiralty plan :—Oyster and Huntington bays, No. 2,457; scale $m = 2\cdot 4$ inches.

From the westward.—When on the E. by N. $\frac{7}{8}$ N. course, and Lloyd point bears S.E. $\frac{5}{8}$ E. the depth will be 10 fathoms, and Eaton Neck lighthouse bearing E. by S. $\frac{1}{4}$ S. should be steered for, passing 4 cables north of Lloyd point shoal.

When Lloyd point bears S.W. by W. $\frac{3}{4}$ W., and East Fort S.E. $\frac{3}{4}$ S. steer S.E. $\frac{1}{4}$ S. for the middle of the woods on West beach (the north entrance point of North port bay), until East fort bears W. $\frac{1}{2}$ S., distant about half a mile, and Eaton Neck lighthouse bears N.E. $\frac{1}{8}$ E. The course is now S. by W. $\frac{1}{4}$ W. as directed above.

Caution.—Care is necessary in approaching Huntington bay, as the direction of the tidal streams is almost at right angles with that of the courses.

Tides and Tidal streams.—It is high water, full and change, in Huntington bay at 10h. 51m. ; springs rise 9 feet, neaps $7\frac{1}{2}$ feet.

At Lloyd harbour, at 11h. 1m. ; springs rise $8\frac{3}{4}$ feet, neaps $7\frac{1}{4}$ feet.

Northward of the entrance of this bay, the flood during its greatest strength, sets about S.W. $\frac{1}{2}$ S. at the hourly rate of $1\frac{1}{4}$ knots ; turns to ebb at the time of the moon's transits and sets during the strength of the latter N.E. by E. $\frac{1}{2}$ E. at about the same rate.

OYSTER BAY the next westward of Huntington bay, is entered between Lloyd point on the east, and centre island on the west. It affords good anchorage in 3 to 7 fathoms water between Centre island and the east shore ; in $2\frac{1}{2}$ to $2\frac{3}{4}$ fathoms between the latter and Cove Neck, known as Cold Spring harbour ; and in Oyster bay harbour, southward of centre island, in 5 to 2 fathoms. The entrance channel, with not less than 6 fathoms water, is contracted to a width of $1\frac{1}{2}$ cables, by Centre island shoal, which extends from that island eastward to within a quarter of a mile of Lloyd Neck. North-west bluff is the name given to a steep cliff, 100 feet high, situated on the east shore, about $1\frac{1}{4}$ miles south-westward from Lloyd point. West fort, is a ruined earthwork, conspicuously placed on the same shore, and abreast the narrows.

The east shore of Oyster bay, should be given a berth of a quarter of a mile, to pass west of the shoal water, which extends with a depth of 6 feet, $1\frac{1}{4}$ cables from the shore, in the vicinity of north-west bluff.

Centre island shoal, with 2 to 5 feet water, extends eastward nearly a mile from that island, its eastern extreme being marked by a red spar buoy, bearing S.E. by E., 2 miles from the black buoy on Centre island reef and S.W., a quarter of a mile from West fort.

East point shoal, with one to 4 feet water on it, extends eastward $1\frac{1}{2}$ cables from East point, the south-east extreme of Centre island.

Dangerous reefs extend a quarter of a mile northward of Cooper bluff, and Smith point, the north-east and north-west extremes respectively, of Cove Neck, and should be given a good berth, when entering Oyster bay harbour.

Directions.—From the eastward.—When on the W. by S. $\frac{7}{8}$ S. course through Main channel of Long island sound, with Great Captain island lighthouse bearing W. by N. $\frac{1}{2}$ N., and the west extreme of north-west bluff S. $\frac{1}{4}$ W., distant $2\frac{1}{2}$ miles, the depth will be 13 fathoms and a S. by W. course will lead with not less than 6 fathoms, to abreast north-west bluff, where the anchorage is good and it is advisable to wait for a pilot.

If bound to Cold Spring harbour; when in the line between north-west bluff and Centre island point, with the former bearing E. by N. $\frac{1}{2}$ N. distant a third of a mile, and West fort bearing S.E. by E., steer S.E. $\frac{1}{2}$ S. which will lead safely, with not less than 4 fathoms, to the red buoy on the east extreme of Centre island shoal. Pass a cable eastward of this buoy, and steer S. $\frac{3}{4}$ E. for the anchorage in $2\frac{1}{2}$ to $2\frac{3}{4}$ fathoms over mud.

If proceeding to Oyster bay harbour, steer S.W. $\frac{1}{4}$ W. after rounding Centre island shoal buoy, passing half a cable south-east of East point shoal, and the same distance north-west of the shoal water off Smith point. When the latter bears S.E. and the long wharf on the south side of the harbour bears S. by W. $\frac{1}{2}$ W., steer S.S.W. $\frac{1}{2}$ W. until the south-east extreme of Centre island bears N.W. $\frac{1}{2}$ W., distant $1\frac{3}{4}$ cables, when alter course to W. $\frac{1}{4}$ N. anchoring as convenient in Oyster bay harbour in from 2 to 5 fathoms. Anchorage may be obtained in 3 to 7 fathoms, after passing Centre island shoal, between Centre island and the eastern shore.

From the westward.—When on the E. by N. $\frac{7}{8}$ N. course through Long island sound, and Great Captain lighthouse bears N.W. $\frac{3}{4}$ W. distant nearly 4 miles, Eaton Neck lighthouse E. $\frac{5}{8}$ S. nearly 7 miles, and Northwest bluff S.E. $\frac{5}{8}$ E. $2\frac{3}{4}$ miles, alter course to S.E. $\frac{1}{4}$ S., which will lead to Centre island shoal buoy, whence proceed as before directed.

Tides.—It is high water, full and change, in Oyster bay, at 11h. 7m.; springs rise $9\frac{1}{4}$ feet, neaps $7\frac{1}{4}$ feet.

ANCHORAGE may be obtained in the bight formed between Centre island and Oak Neck points, in 4 fathoms, sheltered from the eastward by Centre island reef.

HEMPSTEAD HARBOUR is the westernmost harbour suitable for heavy draught vessels on the south shore of Long island sound. It is

formed by a bay $4\frac{1}{2}$ miles long north and south and $2\frac{3}{4}$ miles wide at the mouth, gradually contracting to the head where is situated the village of Hempstead or Roslyn.

Red Spring point the eastern entrance point is a steep wooded bluff, with sandy cliffs, after passing south of which, vessels may anchor as convenient in $4\frac{3}{4}$ fathoms, or less water, over good holding ground, sheltered from all but northerly winds.

Mott point on the western shore, is conspicuous from the sound, as being the south-east termination of a line of yellow sand cliffs, extending nearly from Prospect point.

Glen cove landing, is the name given to the long wharf, situated on the eastern shore, and about three-quarters of a mile southward from Red Spring point.

DANGERS.—The shoals extending from Matinicock and Prospect points, the east and west entrance points respectively of the bay, have already been described (*see page 114*).

Mott point shoal, dry in places extends a quarter of a mile north-east from that point.

Picket rock is one of the most dangerous rocks on that shoal. It is awash at low water, and lies N. by W. distant a quarter of a mile from the east extreme of Mott point.

Between Prospect and Mott points, the west shore should not be approached nearer than a third of a mile.

Downings Landing shoal, extends $3\frac{1}{2}$ cables westward from the wharf of that name, situated on the southern part of the shore of Carpenter's Neck on the east side of the harbour. It is dry at low water a quarter of a mile from the shore, and is avoided if proceeding to the southern part of Hempstead harbour, by keeping the western shore on board.

The eastern shore, should not be approached between Matinicock and Red Spring points, nearer than 3 cables, nor the latter point within $1\frac{1}{2}$ cables.

Directions.—From the eastward.—When on the W. by S. $\frac{7}{8}$ S. course through the sound, with Execution rocks lighthouse, bearing W. by S. $\frac{1}{2}$ S., and Mott point S.S.W. distant 3 miles, steer for the latter until Red Spring point bears E. $\frac{1}{4}$ N. distant three-quarters of a mile. From this position the course is S. $\frac{1}{8}$ E. until the road at Downing Landing bears E. by N. $\frac{1}{2}$ N., and thence S.S.E. for the east extreme of Harbour beach, with not less than 15 feet water to the head of the harbour.

From the westward.—On the E. by N. $\frac{1}{2}$ N. course from abreast of Sands point, when just past Prospect point, with the lighthouse on the former bearing S.W. $\frac{1}{2}$ S. $1\frac{1}{2}$ miles, Motts point S.E. $\frac{1}{2}$ S., $2\frac{1}{2}$ miles, and the wharf at Glen cove Landing bearing S.E. by E. $\frac{1}{2}$ E. distant nearly 3 miles ; steer for the latter until Red Spring point bears N.E. $\frac{1}{2}$ E. distant nearly a mile. From this position steer S. $\frac{1}{2}$ E. and proceed as before directed.

Tides.—It is high water, full and change at Sands point, at 11h. 13m. ; springs rise 9 feet, neaps $7\frac{1}{2}$ feet.

Lifeboats are stationed at Rate point, Fisher island ; and at Eaton point, Huntington bay.

ICE in Long island sound.—In ordinary winters, the floating and pack ice, while impeding navigation, does not render it absolutely unsafe ; but in severe winters, none but powerful steam vessels are able to make headway. During the severe winter of 1874-5, ice caused more general obstruction and delay, in the movements of all classes of vessels, than in any other locality west of the gulf of Maine.

On that occasion, ice formations began to interfere with navigation in the western part of the sound, about the middle of January, and thence until the 23rd of March they rendered the movements of sailing vessels very uncertain and dangerous, and between the 5th of February, and 10th of March, altogether impossible. From the 5th to the 23rd of February, none but powerful steam vessels could be forced through the ice ; and between the 16th and 23rd of the same month even these were compelled either to go outside Long island, or discontinue their trips altogether, the whole sound being covered with heavy ice.

In northerly winds, open water will generally be found on the northern side of the sound, and steam vessels may avail themselves of it ; but it is not a safe course for sailing vessels to pursue, as a shift of wind to the southward, would probably place them in a very critical situation, there being no safe harbours of refuge, into which they could make their way.

Navigators must not depend too implicitly on the light vessels and buoys, as in severe winters they are liable to be drifted away.

TIDES, and Tidal STREAMS, in Long island sound.—It is high water full and change at Plum Gut, (the eastern extreme), and at Throg's Neck, (the western extreme) of the sound, at 10h. 12m., and 11h. 20m., respectively. At the former, the mean rise and fall, is $2\frac{1}{2}$ feet, and at Throg's Neck, springs rise 9 feet, neaps $7\frac{1}{2}$ feet.

In The Race, the flood or west stream during the period of its greatest strength, runs W. by N. $\frac{1}{2}$ N. with an hourly velocity of $4\frac{1}{2}$ knots ; turns

20m. after the moon's transit, and runs during the strength of the ebb or east stream, S.E. $\frac{1}{8}$ E., $4\frac{1}{2}$ knots per hour.

At $3\frac{1}{2}$ miles E.S.E. from Falkner island lighthouse, the flood stream sets W. $\frac{7}{8}$ N., at the hourly rate of $1\frac{1}{4}$ knots, turns to ebb 55 minutes before the moon's transit, and runs S.E. by E. $\frac{1}{8}$ E. $1\frac{1}{2}$ knots per hour. $3\frac{1}{10}$ miles N.N.E. from Eaton Neck lighthouse, the flood stream sets W. $\frac{1}{2}$ S., with the velocity of $1\frac{1}{4}$ knots, turns to ebb 6 minutes before the moon's transit, and runs E. by N. $\frac{1}{4}$ N. at the same rate.

Between Execution rocks and Sands point, the flood stream sets S.S.W. at the hourly rate of half a knot, turns to ebb 46 minutes after the moon's transit, and runs N.E. $\frac{3}{4}$ E. one knot per hour.

The depths given on the shoals, and in the harbours, are above mean low water.

Buoyage.—In the general navigation of Long island sound the buoys marking outer dangers on the north side, are coloured red, and those on the south side, black.

The buoys and beacons in the harbours, and anchorages, are painted in the usual way, that is, those on the port hand in entering, are black, those on the starboard hand red, and those on middle grounds, are painted red and black in horizontal stripes.

South coast of Long island.—This coast, embraced between Montauk point and Gravesend point, the north entrance point of Lower bay of New York, is about 103 miles in extent, and when viewed from seaward presents but few characteristic features. Shinnecock hills and lighthouse are the most conspicuous objects, being situated near the shallow bay of that name, 32 miles westward from Montauk point.

Shinnecock lighthouse is usually looked for by vessels bound to New York. The entrance to Fire island inlet lies nearly midway between Shinnecock bay and Gravesend point, and south, distant 7 miles from the entrance is placed in 13 fathoms, an automatic whistling buoy, a useful guide in approaching New York. The south coast of Long island, between Montauk point and Rockaway inlet, situated 6 miles eastward from Gravesend point, may be safely approached to within three-quarters of a mile, at which distance there is not less than 5 fathoms water.

LIGHTS.—Great West or Shinnecock bay.—This lighthouse is situated upon Pondquogue point, on the north side of Shinnecock bay, and one mile from the sea beach. The tower is coloured red, and attached to the keeper's drab dwelling, exhibiting, at 160 feet above high water, a *fixed* white light, visible 18 miles, excepting from the westward where the light is obscured when bearing east of N.E. by E.

Fire island lighthouse is erected upon the east entrance point of the inlet of that name, and exhibits from a yellow tower attached to the keeper's dark gray dwelling, from an elevation of 168 feet above high water, a *flashing* white light; the interval between the flashes is *one minute*, and the light is visible 19 miles, excepting from the westward, where it is obscured when bearing east of E. by N.

Lifeboats are stationed at short intervals between Montauk and Gravesend points.

TIDAL STREAMS, south coast of Long island.—Between Montauk point and Fire island inlet, the ordinary direction of flood (or west) and ebb (or east) streams, is parallel to the coast; but between Fire island inlet and Sandy Hook, the flood stream has a tendency, especially in the neighbourhood of the inlets, to set north-west, with a velocity of $1\frac{1}{2}$ to $2\frac{1}{2}$ knots per hour. Allowance must be made for this dangerous tendency, when approaching New York from the eastward.

NEW YORK HARBOUR* is situated at the confluence of Hudson and East rivers, and is divided into Upper and Lower bays, by a passage a mile in width, between Staten and Long islands, known as The Narrows.

Lower bay is entered from seaward, between Gravesend point on the north, and Sandy Hook point on the south, distant 6 miles from each other. The entrance is obstructed by extensive shoal banks, separating which, are five principal passages, named South, Gedney, Main, Swash and East channels, but the latter and northernmost of these is not recommended to strangers.

Of the remainder, the passage by Gedney and Main channels is the most suitable for strangers, 23 feet at mean low water being the least depth in the former, and 22 feet in the latter, passing close north of Sandy Hook point.

Vessels from the southward usually enter by South channel, which at mean low water has a depth of $22\frac{1}{2}$ feet.

Swash channel, with $4\frac{1}{2}$ fathoms, lies between Main and the western part of East channels, and is safe only with a commanding breeze and clear weather, as the tidal streams set obliquely across it.

The above channels unite about 2 miles southward from Gravesend point.

The south and west portions of Lower bay are known as Sandy Hook and Raritan bays, the former containing good anchorage in all but northerly winds.

* See Admiralty plan:—Approaches to New York, No. 2,491; scale, $m = 0\cdot 9$ of an inch.

The city of New York, with a population of 1,206,590 in 1880, occupies the southern part of Manhattan island, separated by Hudson river from the cities of New Jersey and Hudson, and the town of Hoboken.

The city of Brooklyn, with a population of 586,689 in 1880, is built upon the south bank of, and at the western entrance to East river, and on its north-east side, in Wallabout bay, is situated the United States Naval dockyard, containing a dry dock 320 feet in length, 70 feet broad, and with a depth of 25 feet water over the sill. In addition to this, there are two lift docks.

Kill Van Kull is the name of the water connecting the western part of Upper bay with Newark bay, and separating Staten island from Bergen Neck.

The most conspicuous objects in approaching the entrance to New York harbour from seaward, are Navesink lighthouses, erected upon the eastern spur of the Highlands of Navesink, and situated $4\frac{2}{3}$ miles southward from Sandy Hook point.

Quarantine stations are established on the eastern portion of West bank, South $1\frac{1}{10}$ and $2\frac{1}{10}$ miles respectively from fort Tompkins built on the west entrance point of The Narrows.

Time signal.—A time ball is dropped daily from the flag-staff surmounting the Western Union Telegraph building in New York, and can be seen from the shipping lying in New York and Brooklyn docks, those on the Jersey shore, as well as by all vessels in New York bay.

The ball is hoisted half-mast at 11h. 55m. and to its highest point at 11h. 58m. a.m., and dropped at the instant of mean noon, New York corresponding to 4h. 56m. 1.65 secs. mean time at Greenwich.

If by accident the ball does not fall at this time, it will be dropped at minutes exactly past mean noon; in which case a red flag will be hoisted at one minute, and remain flying until 10 minutes past mean noon.

Pilots.—By the New York pilot laws, all masters of foreign vessels or of vessels from foreign ports, must take a pilot in entering New York harbour, or pay the same pilotage as if one had been taken. New York pilot boats cruise between Nantucket and cape May, and are frequently met with, 350 miles from Sandy Hook. Strangers are strongly recommended to accept the earliest offer of a pilot, by which means they will have his local knowledge, as to how the set of the streams, and position of the buoys, are affected by recent gales.

LIGHTS.—**Sandy Hook light vessel**, painted red, with the words Sandy Hook on each side, lies in 14 fathoms water, south-eastward from the entrance to New York bay; E. by S. $\frac{1}{2}$ S. $6\frac{1}{4}$ miles from Sandy Hook lighthouse, and E.N.E. $6\frac{1}{2}$ miles distant from Navesink lighthouses.

The vessel exhibits two *fixed red* lights, each 45 feet above high water, and visible from a distance of 12 miles.

Fog signal.—A bell and horn are sounded in foggy weather.

Wreck of the Scotland.—A light vessel is placed in 7 fathoms water, close to the site of the wreck of the steam ship Scotland. She is painted lead colour, with the words wreck of Scotland on each side; and has two masts with circular day-marks at each masthead, from which are exhibited, at an elevation of 45 feet above high water, two *fixed* white lights, visible 12 miles.

Fog signal.—A bell is sounded in foggy weather.

Highlands of Navesink.—On the eastern spur of the highlands of Navesink, $4\frac{1}{2}$ miles south of Sandy Hook point, are two brown towers, 53 feet high, bearing N.W. and S.E.; distant 76 yards from each other, and connected by a dwelling of the same colour. They each exhibit a *fixed* white light, elevated 248 feet above high water, and visible 22 miles, between the bearings of N. by W. and S.E.

Sandy Hook.—This lighthouse is situated three-quarters of a mile southward of Sandy Hook point. It is a white tower 77 feet high, attached to keeper's dwelling, and exhibits, at 90 feet above high water, a *fixed* white light, visible seaward 15 miles, between the bearings of N. by W. and E. by N.

East beacon (Hook).—Marking the north extreme of Sandy Hook point, is a tower painted red, 42 feet high, and exhibiting, at an elevation of 46 feet above high water, a *fixed* white light, visible 12 miles, when bearing from W. by N., through south to E. by N.

Fog signal.—In foggy weather a syren is sounded, giving blasts of *six seconds* duration, at intervals of *forty seconds*.

West beacon.—This tower stands on the west shore of Sandy Hook, and about half a mile southward from East beacon, and is used in conjunction with Sandy Hook lighthouse, as a leading mark for part of Main channel.

It is painted white, 30 feet high, and exhibits, at an elevation of 45 feet above high water, a *fixed* white light visible 11 miles, when bearing from S.W. (through south) to E. by N.

Main channel beacon lights.—Near the beach on the south shore of Sandy Hook bay is situated a tower painted white and red in horizontal bands, and known as Conover beacon. It is 55 feet high, and exhibits, at 60 feet above high water, a *fixed* white light, visible 13 miles.

On the summit of Chapel hill, S. by W. $\frac{1}{2}$ W., distant $1\frac{1}{2}$ miles from Conover beacon, is a white tower, which exhibits, at 224 feet above high water, a *fixed* white light, visible 21 miles. These lights in line lead through Main channel, from south-west spit to The Narrows.

Point Comfort beacon (Bay side).—About three-quarters of a mile south-eastward of Point Comfort, near the beach, is erected a white beacon, 40 feet high, which exhibits, at 45 feet above high water, a *fixed* white light, visible 12 miles. For the convenience of rating chronometers, the position of this beacon is ascertained to be in lat. $40^{\circ} 26' 51''$ N., long. $74^{\circ} 7' 18''$ W.

Waackaack (Wilsons).—At about three-quarters of a mile W. by S. $\frac{1}{2}$ S. from the above, near Waackaack beach, is another white beacon, 68 feet high, which shows, at 76 feet above high water, a *fixed* white light, visible 14 miles. These lights in line lead through the eastern portion of Main channel.

Swash channel beacon lights.—Elm tree beacon, is erected upon the south-east shore of Staten island; it is 55 feet high, and painted white with a red band, exhibiting, at an elevation of 62 feet above high water, a *fixed* white light visible 13 miles.

New Dorp beacon, stands upon high ground, N.W. $\frac{1}{2}$ N. distant $1\frac{1}{2}$ miles from Elm tree beacon; it is painted white, and exhibits, from an elevation of 192 feet above high water, a *fixed* white light visible 20 miles.

New Dorp beacon, open a little north-eastward of Elm tree beacon N.W. $\frac{1}{4}$ N., leads through South and Swash channels.

Princess bay.—This lighthouse stands near that bay, situated nearly 2 miles north-eastward from Ward point, the south-west extreme of Staten island. It is of brown colour, and attached to the keeper's dwelling, exhibiting, at 106 feet above high water, a *fixed* white light, varied by a *white flash every two minutes*, and visible seaward 16 miles between the bearings of W. by S. and N.E. $\frac{3}{4}$ E. This light is intended to guide vessels to Amboy, and into Raritan river; and also through Gedney channel.

Fort Tompkins.—On the west entrance point of The Narrows, and a little to the southward of the fort, is a tower, surmounting the keeper's dwelling, both of drab colour, which exhibits, at 90 feet above high water, a *fixed* white light, visible seaward 15 miles, between the bearings of S. $\frac{3}{4}$ E. and N.E. by N.

Fog signal.—Fort Lafayette.—In foggy weather a bell is sounded from this fort, giving *one* and *two* strokes alternately, separated by intervals of *twenty seconds*.

Robbins reef.—This lighthouse is erected upon the reef of that name situated on the south-east part of Jersey flats and north-eastward from Tompkinsville. It is a white tower 46 feet high, which exhibits, at 58 feet above high water, a *fixed* white light, visible 13 miles.

Fog signals.—A bell is sounded during foggy weather, at intervals of *fifteen seconds*.

Fort Columbus.—In foggy weather, a bell is sounded from the north-west extreme of Governor island, giving *two strokes* in quick succession every *twenty seconds*.

DANGERS AND BUOYS in GEDNEY, MAIN, and SWASH CHANNELS.—Automatic whistling buoy.—This buoy is painted red, and lies in 9 fathoms water, at the eastern part of the fairway of Gedney channel ; bearing E. by S. $\frac{1}{2}$ S., distant $13\frac{1}{4}$ miles, from Princess bay lighthouse, and E. by N. $\frac{1}{2}$ N., $3\frac{1}{4}$ miles from Sandy Hook lighthouse.

Entrance buoy.—This buoy, painted white and black in perpendicular stripes, and surmounted by a perch and ball, is moored in $5\frac{1}{2}$ fathoms in the fairway of the same channel, about half a mile westward from the automatic whistling buoy.

Inner mid channel buoy, is the name given to the buoy also in the fairway of Gedney channel, and at the turning point from it to Main channel. It is nun shaped, and painted white and black in perpendicular stripes, bearing E. by S. $\frac{1}{2}$ S. from Princess bay lighthouse, and E. by N. $\frac{1}{2}$ N. from point Comfort and Waackaack beacons in line.

The Romer or Romer shoal as it is frequently named, with depths varying from 4 to 17 feet, is a sand bank, about 5 miles in length, north-west and south-east, with an average width of three-quarters of a mile.

Its south-eastern portion divides Gedney and the eastern part of East channel, and the western portion separates Swash channel from the western part of the same.

Its south-east, south, and west extremes are marked by the following red coloured can buoys with even numbers.

No. 2, placed in 22 feet water, south-east 2 cables distant, from a patch of 18 feet ; bearing N.W. by W. $\frac{1}{2}$ W. distant half a mile from the automatic whistling buoy.

No. 4, moored in $3\frac{1}{4}$ fathoms, bearing N.E. $\frac{1}{2}$ E., $2\frac{3}{4}$ miles distant from Sandy Hook lighthouse.

No. 6, with staff and square, placed in 3 fathoms, a little southward of a spit with 13 feet water on it ; about 4 cables north-westward of Inner Mid-channel buoy.

No. 4, lying in $4\frac{1}{2}$ fathoms, and bearing N.W. by W. $\frac{1}{2}$ W., about a mile distant from the same.

No. 6, placed in $3\frac{1}{2}$ fathoms, bearing N.W. $\frac{1}{2}$ W., $3\frac{1}{2}$ cables distant from No. 4.

The last two buoys are numbered for Swash channel.

No. 8, marking the north-west edge, placed in 4 fathoms bearing S. $\frac{1}{2}$ W. distant 9 cables from No. 14 buoy.

No. 14, (numbered for Main channel), placed in 22 feet water, marking the north extreme of The Romer, and bearing S. by E. $\frac{3}{4}$ E., from Lower Quarantine, S.S.W. $\frac{3}{4}$ W. from Gravesend point, and N. $\frac{1}{4}$ E. distant 9 cables from No. 8 buoy.

In addition to the above mentioned red can buoys, the shoalest part of The Romer with 4 feet water on it, known as Dry Romer is marked by a stone beacon, bearing N. $\frac{1}{2}$ W. distant $3\frac{1}{10}$ miles from Sandy Hook lighthouse.

The north-east and east sides of The Romer are marked with black buoys in connection with East channel, which as before stated is unfit for strangers.

On the south side of Gedney channel are placed two black nun buoys. The easternmost of which bears S.W. $\frac{1}{2}$ S. distant $4\frac{1}{2}$ cables from No. 2 red can buoy of The Romer. It does not mark any particular shoal, but is placed in 5 fathoms as a guide for the deepest water.

The other buoy is marked No. 3 and is placed on the north side of a lump with 17 feet water over it, eastward $4\frac{1}{4}$ cables from Inner Mid-channel buoy, and one cable southward of the fairway course.

East and **Flynn knolls** are the names given respectively to the north and south portion, of the large bank separating Main and Swash channels ; Flynn knoll has from 10 to 16 feet water over it, marking which are the following buoys :—

Palestine buoy, painted red and black in horizontal stripes placed in 5 fathoms, marking the site of a shoal which now has no existence, and bearing N. by E. $\frac{3}{4}$ E., distant $1\frac{3}{4}$ miles, from Sandy Hook lighthouse.

No. 8, red and can shaped, moored in 4 fathoms, south-eastward of a patch with 18 feet water over it.

No. 8 $\frac{1}{2}$, red can, surmounted by a perch and ball, placed in 4 fathoms near the turning point in Main channel.

No. 10, red, placed westward of south-west spit from Flynn knoll, and close to the fairway mark of Sandy Hook lighthouse in line with West beacon, bearing S.E. $\frac{1}{2}$ E.

No. 10½, red and can shaped, moored in 4 fathoms, north-west of Flynn knoll and bearing N.W., distant 2 miles from East beacon, (Hook).

East knolls, with 11 feet least water over it, is marked by the following buoys :—

No. 12, red, can shaped, and placed in 4½ fathoms, on the western side.

A red and black horizontally striped nun buoy, is moored in 5 fathoms, northward 3½ cables from the north extreme, at the junction of Main and Swash channels, bearing N. by E., distant one mile from No. 12.

No. 5, black, nun shaped, on north-east side placed in 20 feet of water, and bearing W. ½ S., distant 6 cables, from Dry Romer beacon.

No. 3, black, and nun shaped, on the east side, in 3½ fathoms, bearing W. by N. 6½ cables from No. 6 buoy of The Romer.

A red and black horizontally striped buoy marks a shoal with 26 feet water over it known as New shoal situated 3½ cables north-westward from No. 3.

Sandy Hook point shoals.—Shoal water, extends some distance north-eastward from Sandy Hook point, and is marked by three buoys.

The easternmost, is a black nun buoy marked No. 5, and placed in 4½ fathoms, bearing E.N.E., distant 3½ cables from East beacon (Hook).

The middle buoy is red, and spar shaped, placed in 5 fathoms, bearing N.E. by N. from the same.

No. 5½ is a black nun buoy, bearing N.N.E., distant 3½ cables from East beacon, and S. ¾ W. 3½ cables from No. 8 of Flynn Knoll.

West knoll, with 16 feet water over it, lies on the west side of Main channel, and nearly abreast East knoll. It is nearly a mile long N.N.E. ½ E. and S.S.W. ½ W., and is marked by a black nun buoy, placed in 3½ fathoms, on its south-east side, bearing N. by W., 1½ miles distant, from South-west spit buoy of Flynn knoll.

Staten island Flats, extend from 1½ to 2½ miles eastward from the south-east side of Staten island. A black nun buoy marked No. 9 is placed on the eastern edge in 3½ fathoms, bearing W. by N. ¾ N., distant 6½ cables from No. 14 of the Romer.

West bank, bare in places, and bold-to on the east side, is the name given to the shoalest, and north-east portion of Staten island Flats.

The eastern side is marked by four black buoys placed as follows :—

No. 11, nun shaped, in 3½ fathoms, bearing S. by E. ¾ E., distant three quarters of a mile, from Dix island the site of Lower Quarantine station.

No. 13, nun shaped, in 3½ fathoms, bearing east 3 cables from the same.

No. 15, near the north extreme, and No. 15½, spar shaped on the eastern edge, between No. 15 and fort Tompkins.

Cravens shoal, is an isolated patch, with 18 feet water over it, lying S.S.E. distant one mile from Fort Tompkins lighthouse, and is marked by a red and black horizontally striped spar buoy, placed on its eastern side.

East bank, with 3 feet least water over it, extends southward from Coney island, its west side being marked by a red buoy, marked No. 18, bearing S.W. by S. two-thirds of a mile distant from Gravesend point. To pass westward of this bank, fort Lafayette should not be brought to bear west of N. $\frac{3}{4}$ W.

Gowanus Flats, with 10 to 15 feet of water over them, extend westward and south-westward from Gowanus bay, situated on the western side of Long island and southward of Red Hook. The west side is marked by two red buoys, the southernmost of which is can shaped, marked No. 18, placed in 4½ fathoms, and bears S.S.E. $\frac{1}{2}$ E., distant one mile from Robbins reef lighthouse.

The northern buoy is marked No. 20, spar shaped and bears E. by N. $\frac{1}{4}$ N., distant 1½ miles from the same lighthouse, and N.E. by N. $1\frac{6}{10}$ miles from No. 18.

Jersey Flats are situated on the west side of Upper bay, and extend south-eastward one to 2 miles from the shore of Bergen Neck, embraced between Constable point, (the northern entrance point of Kill Van Kull), and Communipaw Docks (forming the western entrance point of Hudson river). This extensive bank is partially dry at low water, the remainder having from 3 to 6 feet water over it, is marked by Robbins reef lighthouse, Bedloe and Ellis island, the former of these islands, containing the United States Magazine, and the latter having erected upon it a large statue. In addition to this, the south-eastern and eastern edges are marked by 2 black nun buoys.

The southern buoy, marked No. 17, is placed in 3 fathoms, bearing S. $\frac{3}{4}$ E. distant 2½ cables from Robbins reef lighthouse.

The other buoy is marked No. 19 and is moored in 3½ fathoms 2 cables east of Oyster island, a low artificial island on the eastern edge of Jersey Flats.

Governor island West shoal extends south-west, 4½ cables from the island of that name, which is situated in the middle of the western entrance to East river.

A black spar buoy marked No. 1 is placed in 3½ fathoms near the south-west extreme.

Northward of Governor island there are no dangers, it only being necessary to give Bedloe and Ellis islands a berth of a quarter of a mile, and being careful on the flood stream, to avoid being set into East river.

Directions by Gedney and Main channels.—A N.W. $\frac{1}{2}$ N. course for $3\frac{1}{2}$ miles will lead from Sandy Hook light vessel to the automatic whistling buoy, which has been heard from a distance of 5 miles. From this buoy steer W. by N. $\frac{1}{8}$ N. for Princess bay lighthouse in line with Entrance and Inner Mid-channel buoys until the latter is reached, with not less than 23 feet at mean low water passing nearly midway between No. 1 and No. 2 buoys, and $1\frac{1}{4}$ cables northward of No. 3.

From Inner Mid-channel buoy, steer for Waackaack and Point Comfort beacon lights in line, bearing W. by S. $\frac{1}{2}$ S. until Sandy Hook lighthouse is in line with West beacon, bearing S.E. $\frac{1}{2}$ E. passing a quarter of a mile southward of Palestine and No 8 buoys, and three-quarters of a cable northward of No. $5\frac{1}{2}$ buoy, of Sandy Hook point shoal, with not less than 26 feet of water. Proceed now N.W. $\frac{1}{2}$ W. with Sandy Hook lighthouse and West beacon in line until past No. 10 buoy marking South-west spit, with not less than 27 feet water and Chapel hill and Conover beacon lights are in one bearing S. by W. $\frac{1}{8}$ W. Steer N. by E. $\frac{1}{8}$ E. with the latter marks on for $6\frac{1}{2}$ miles until fort Tompkins bears N.W. by N. which will lead westward of East knolls, the Romer and East bank, and eastward of West knolls, Staten island Flats, and West bank, the least water 22 feet being found just north of No. $10\frac{1}{2}$ buoy of Flynn knoll.

Proceed now N. by W. for Robbins reef lighthouse until abreast Tompkinsville, whence it is advisable for sailing vessels to take a tug to avoid collision owing to the crowded state of the shipping in Upper bay.

But if proceeding up under sail, when on the N. by W. course and the western extreme of Governor island bears N.E. $\frac{3}{4}$ N., steer N.N.E. $\frac{1}{2}$ E., until past the Battery on the south-west extreme of the city of New York, when if intending to anchor on the Jersey haul over towards that shore and anchor in $4\frac{1}{2}$ fathoms over mud.

Directions by Gedney and Swash channels.—When on the W. by N. $\frac{1}{2}$ N. course through Gedney channel until nearly a mile westward of Inner Mid-channel buoy, and New Dorp beacon is open a little north-eastward of Elm Tree beacon bearing N.W. $\frac{1}{4}$ N. Proceed now for these objects in this position through Swash channel with not less than $4\frac{1}{2}$ fathoms being careful on the flood tide not to bring the beacons in line, and when Chapel hill and Conover beacons come in line, bearing S. by W. $\frac{1}{8}$ W. proceed N. by E. $\frac{1}{8}$ E. as before directed.

DANGERS AND BUOYS in South channel.—This channel has two fairway buoys, named and coloured similarly to those in Gedney channel.

Entrance buoy, the south-easternmost of these, is painted black and white with perpendicular stripes, placed in $6\frac{1}{2}$ fathoms water, and bears E. by N. $\frac{1}{2}$ N., distant 9 cables from Scotland light vessel, and W. $\frac{3}{4}$ N. $2\frac{3}{4}$ miles from Sandy Hook light vessel.

Inner Mid-channel buoy, is can shaped and similarly painted, and placed in 22 feet at mean low water, bearing N.W. $\frac{1}{4}$ N. distant $1\frac{1}{2}$ miles from Entrance buoy, and East $2\frac{4}{10}$ miles from Sandy Hook lighthouse.

The Lump.—A small 3-fathom patch, lies on the north-east of the channel, and is marked by a red and black horizontally striped nun buoy, placed on its east side bearing E. $\frac{1}{2}$ N., $2\frac{3}{4}$ miles distant from Sandy Hook lighthouse.

False Hook shoal, with 12 to 16 feet water over it, lies on the south-west side of the channel and is $1\frac{3}{4}$ miles long N.N.W. $\frac{3}{4}$ W. and S.S.E. $\frac{3}{4}$ E. The southern portion known as The Oil Spot is three-quarters of a mile broad, being marked by black buoys; the northernmost being spar shaped and marked No. 3, bearing N.W. $\frac{1}{2}$ N. distant one mile from Scotland light vessel.

The southern buoy is nun shaped, marked No. 1 and placed in $3\frac{1}{2}$ fathoms bearing W. by N. $\frac{1}{2}$ N., distant $4\frac{1}{4}$ cables from the same.

The north extreme of False Hook shoal, is marked by a nun buoy painted red and black with horizontal stripes, placed in 3 fathoms and bearing N.E. $\frac{1}{4}$ E., distant three-quarters of a mile from Sandy Hook lighthouse.

Directions by South and Main channels.—From Sandy Hook light vessel, steer W. $\frac{7}{8}$ N. until abreast Entrance buoy, whence steer for New Dorp beacon open a little north-eastward of Elm Tree beacon, bearing N.W. $\frac{1}{4}$ N., and when Waackaack and Point Comfort beacons are in line, bearing W. by S. $\frac{1}{2}$ S., proceed for them as before directed.

By South and Swash channels—From Entrance buoy, continue the N.W. $\frac{1}{4}$ N. course for New Dorp beacon upon a little northward of Elm Tree beacon, the common leading mark for both these channels. When Chapel hill and Conover beacons are in line, bearing S. by W. $\frac{1}{8}$ W., the vessel will be in main channel, and should steer N. by E. $\frac{1}{8}$ E., with these marks on as before directed.

Lifeboats are stationed at the entrance to Rockaway Inlet, Coney island, and at short intervals between Sandy Hook and Little Egg harbour.

System of buoyage.—In entering New York harbour from seaward, red buoys are on the starboard and black buoy on the port side of the various channels.

Buoys striped red and black horizontally, mark middle grounds, and those coloured black and white with perpendicular stripes, are moored on the fairway courses.

The depths given on the shoals and in the channels are above mean low water, or 6 inches more than will be found at low water of ordinary spring tides.

Tides and tidal streams in New York harbour.—It is high water, full and change, at Sandy Hook at 7h. 29m.; springs rise $5\frac{1}{2}$, neaps rise $4\frac{1}{2}$ feet. At Governor island at 8h. 13m.; springs rise $5\frac{1}{2}$, neaps rise $4\frac{1}{4}$ feet.

At 2 miles N.E. from Sandy Hook lighthouse, near the junction of the four channels, previously described, the flood or ingoing stream at the period of its greatest strength sets N.W. by $\frac{1}{2}$ W., 2 knots per hour, turns to ebb 8h. 12m. after the moon's transit, and runs during the greatest strength of the ebb stream E. $\frac{3}{4}$ S. at the hourly rate of 3 knots, turning again to flood at 1h. 57m. after the moon's transit, making the duration of the flood stream about $6\frac{1}{2}$ hours, and that of the ebb $5\frac{3}{4}$ hours.

In the Narrows the set of the strength of the flood stream is N.N.E. $\frac{1}{2}$ E., and velocity one knot per hour, turning to ebb 10h. 7m. after the moon's transit. The ebb stream at its greatest strength sets S. $\frac{3}{4}$ W. at the hourly rate of $1\frac{1}{2}$ knots, and turns again to flood at 3h. 54m. after the moon's transit.

At the automatic whistling buoy, in the entrance to Gedney channel, the flood and ebb streams set respectively about N.N.W. $\frac{1}{4}$ W. and S.E. $\frac{1}{2}$ S. at the hourly rate of one knot.

GENERAL REMARKS ON APPROACHING NEW YORK HARBOUR.—The Gulf stream affords the earliest indication of approaching New York from the south-eastward, its southern and northern limits being about 430 and 240 miles distant respectively; the temperature being from 70° to 75° , and that of the adjacent waters 51° Fahrenheit in the summer months. On striking soundings the dark colour of the water will change to that of a light blue, and the temperature still further slightly decrease.

MUD HOLES.—There are several remarkable depressions of the bottom extending in a south-easterly direction from Sandy Hook, which, on account of their positions being accurately determined, afford to the mariner an excellent indication of his distance from the coast, and the direction of the entrance to New York harbour.

One hundred and forty-five fathom hole, the bottom of which consists of green mud, blue mud, and green ooze, lies in lat. $39^{\circ} 38' N.$, long. $72^{\circ} 24\frac{1}{2}' W.$

Fifty fathom hole covers an area of about half a mile square and is situated in lat $40^{\circ} N.$ long $72^{\circ} 29\frac{1}{2}' W.$ Depths varying from 35 to 40 fathoms will be found at the distance of 5 miles on its north, east, and south sides, and from 30 to 33 fathoms the same distance on the west side.

Thirty-five fathom hole extends east and west from 4 to 5 miles. The bottom is black mud, and the eastern edge is in lat. $39^{\circ} 40\frac{3}{4}' N.$ long. $73^{\circ} 6' W.$ bearing S.S.E. $\frac{1}{4} E.$, distant 57 miles from Sandy Hook light vessel.

Thirty-eight fathom hole, the bottom of which is dark gray sand and mud, is about 6 miles long in a N.N.W. and S.S.E. direction, the southern edge being in lat $39^{\circ} 53\frac{1}{2}' N.$ long. $73^{\circ} 7' W.$ The depth of 30 fathoms is found from 15 to 16 miles eastward of the hole, and 28 fathoms close to the eastern edge over gray and yellow sand. Its north extreme bears S.E. $\frac{1}{4} S.$, distant 42 miles from Sandy Hook light vessel.

Second thirty-seven fathom hole is from 2 to 3 miles long in an east direction. The bottom consists of dark gray sand and mud, and its eastern edge bears S.S.E. $\frac{7}{8} E.$, distant $34\frac{1}{2}$ miles from Sandy Hook light vessel. As little as 21 fathoms is found 2 miles distant from the southern edge.

First thirty-seven fathom hole, commonly known as the Mud Hole, extends from 2 to 3 miles N.N.W. and S.S.E., with a bottom of black mud, the north extreme bearing S.S.E. $\frac{1}{4} E.$, distant 22 miles from Sandy Hook light vessel. The depth of 20 fathoms, gray sand, is found half a mile S. $\frac{1}{2} W.$ from the south edge, and 19 fathoms within one mile S.E. by E. $\frac{1}{2} E.$ of the same, while $3\frac{1}{2}$ miles from the northern edge there are 20 fathoms over gray sand and black specks, with a slight mixture of gravel.

The average direction of the 20 fathom line bordering the south coast of Long island is W.S.W., and that of the New Jersey coast N. by W. $\frac{1}{2} W.$, converging to and only separated by the north extreme of the Thirty-seven fathom hole last mentioned.

From this position these same lines extend parallel, 2 miles apart, almost directly for Sandy Hook light vessel, ultimately joining at about 4 miles S.S.E. from this light vessel. In the narrow gorge thus formed are situated the remaining five deep muddy holes, named Thirty-two, Inner thirty-two, Twenty-eight, Twenty-one, and Twenty-three fathom holes, the centre of the latter and northernmost bearing S.S.E. $\frac{3}{4} E.$, distant $5\frac{1}{2}$ miles from Sandy Hook light vessel.

In thick weather, vessels from the southward, striking the depth of 20 fathoms north of Barnegat, will find this gorge a useful check on their course of about N. by W. $\frac{1}{2}$ W., for Sandy Hook light vessel.

Cholera bank, with 10 fathoms least water over rocky bottom, is between 5 and 6 miles long E. by S. $\frac{1}{2}$ S., and W. by N. $\frac{1}{2}$ N., with an average width of $1\frac{1}{4}$ miles, and from the contrast between the nature of the bottom, and that of the surrounding waters, more than from the dissimilarity of depth, offers a good indication of a vessel's position.

A bank with 9 fathoms on it, is reported to lie E.S.E., distant 5 miles from Sandy Hook light vessel. Owing to the relative positions of the shores of Long Island and New Jersey, it follows that a course, which would deepen the water on the Long Island side of the approach to the entrance to New York harbour, would shoal the water were she on New Jersey coast. Upon this fact, for the guidance of vessels in thick weather is based the following directions:—

Striking 15 fathoms and in doubt as to vessel's position, steer S.W. by S., when if the water deepen, she is on the Long Island shore, if it shoal, she is on the New Jersey coast.

In the former case a vessel should stand off and on, taking care not to shoal to less than 12 fathoms until up with Sandy Hook light vessel, or within the sound of the automatic whistling buoy.

In the latter case, the ship's head must be put off shore, as near E. by S. as possible, until the depth of 20 fathoms is obtained, keeping in not less than that depth, if a stranger, until the weather clears up.

LINES OF APPROACH to NEW YORK.—From Great Britain and northern Europe it is usual to pass south of Nantucket shoals, in about lat. $40^{\circ} 40'$ N., long. $69^{\circ} 20'$ W., Nantucket New South shoal light vessel bearing N.W. $\frac{1}{2}$ W., distant 28 miles, where the depth is 32 fathoms, over fine gray sand and black specks. From this position, the course for Sandy Hook light vessel is S. 86° W. (true), and distance 207 miles.

Block Island channel is the name by usage, given to the whole of the southerly approach to Block Island sound, northward of the 100-fathom; its blue mud and green ooze, serving as valuable guides to a vessel's position. On the above course for New York indications of this channel will be first had in long. $70^{\circ} 30'$ W., where the depth will have deepened to 40 fathoms, over green ooze. After passing the meridian of Montauk point, the peculiar nature of the bottom of this channel will be lost, and the depth will gradually diminish to the entrance to New York harbour.

On the whole of this course, the lead should be hove at regular intervals, and after passing the meridian of $73^{\circ} 15'$ W., at every 2 miles, the depth from this longitude being nowhere greater than 15 fathoms, and in some places as little as 12 fathoms.

If the weather be thick and the depth as little as 10 fathoms, the vessel's head should at once be put off shore following the directions previously given.

Under ordinary circumstances the S. 86° W. (true) course will lead a vessel within sight of Fire island light, and from 4 to 5 miles southward of the automatic whistling buoy, moored off the same. Sandy Hook light vessel being made, follow the directions for entering New York Harbour.

Caution.—In approaching New York from northern Europe, the variation of the compass, differs about one point, in the distance of 500 miles, when westward of the Meridian of 60° West.

From the south-westward, vessels either make Five-fathom bank light vessel, or Barnegat lighthouse. In the former case the course and distance from one mile eastward of the light vessel to abreast of the latter, is N.E. by N. (northerly) 60 miles. When Barnegat lighthouse bears N.W. by W., distant 7 miles, steer N. by E. $\frac{1}{4}$ E. for Sandy Hook light vessel, distant 45 miles, with not less than 10 fathoms of water.

In easterly gales, from the same position eastward of Five-fathom bank light vessel, steer N.E. $\frac{3}{8}$ N. with not less than 11 fathoms, until Absecon lighthouse bears N.W. $\frac{1}{4}$ W., distant about 12 miles, whence proceed N.E. by N. for 30 miles, with not less than $10\frac{1}{2}$ fathoms, until Barnegat lighthouse bears N.W. by W., distant 11 miles. The course for Sandy Hook light vessel from this position, is N. $\frac{3}{4}$ E. with not less than 10 fathoms. From the light vessel, enter the harbour as previously directed. These are safe courses in clear weather, but in thick weather the coast should not be approached to less than 15 fathoms. The N.E. by N. course from Five-fathom bank light vessel, may also be continued until the depth of 20 fathoms is obtained near the north-west side of First thirty-seven fathom Hole, whence N. $\frac{3}{4}$ W. will lead to Sandy Hook light vessel.

From the east coast of South America, or the Equator, vessels usually pass 160 miles eastward of cape Hatteras, and make a straight course thence of N. $\frac{3}{4}$ W., for Sandy Hook light vessel.

LIGHTS on south-east coast of NEW JERSEY.—**Barnegat** lighthouse, 150 feet high, is situated on the north extreme of Long Beach, and the south entrance point of Barnegat inlet; the upper half is painted red, and the lower half white, and exhibits, at an elevation of 165 feet above high water, a *flashing* white light, the intervals between the flashes being *ten seconds*, visible from a distance of 19 miles. From the southward, the light is not visible, when bearing east of N.N.E.

Tucker Beach.—The lighthouse on Tucker island, near the entrance to Little Egg harbour, is painted red, and exhibits at an elevation of 52 feet above high water, a *fixed* white light for *one minute*, followed during the *next minute*, by *six red flashes*, at intervals of *ten seconds*, and visible from a distance of 12 miles. From the south-westward, the light is obscured when bearing eastward of N.E. by N.

An automatic whistling buoy, painted black, is placed about 2 miles eastward of Brigantine shoal, in 8 fathoms water, bearing East $6\frac{1}{2}$ miles from Absecon lighthouse, and S. $\frac{1}{2}$ W., $7\frac{1}{2}$ miles from Tucker beach lighthouse. Vessels should pass eastward of this buoy.

Absecon.—This lighthouse is situated on the south side of the inlet of that name. It is 159 feet high, and painted white, red, and white, in horizontal stripes, exhibiting, at an elevation of 167 feet above high water, a *fixed* white light, visible from a distance of 19 miles. From the south-westward, this light is obscured when bearing eastward of N.E.

Tides and tidal streams on south-east coast of New Jersey.—It is high water, full and change, at Little Egg harbour, at 7h. 10m.; springs rise $4\frac{1}{2}$ feet, neaps $3\frac{1}{2}$ feet.

As a rule the flood and ebb, or north-east and south-west streams, when uninfluenced by the winds, follow the trend of the shore, except close in near the entrances to the several inlets, where the flood stream has a tendency to set on to the coast, and the ebb stream to set more to seaward.*

DELAWARE BAY and RIVER† is the name given to a large inlet of the sea, situated between the States of Delaware and New Jersey, extending in a general north and south direction 90 miles, having a breadth of 10 miles at its entrance between cape May on the north-east, and cape Henlopen on the south-west. Its depth varies from 15 fathoms at the entrance, to 10, 8, and $4\frac{1}{2}$ fathoms at low water spring tides 20 miles from the entrance, and this latter depth it maintains for 20 miles further to Bombay Hook roads, an anchorage much frequented by vessels waiting wind or tide. Main channel at the entrance, between the south-west part of Overfalls shoals, and cape Henlopen is nearly 4 miles wide.

That portion of this extensive water, northward of Bombay Hook point, is usually known as Delaware river, while that to the southward of the same, generally takes the name of Delaware bay. At Bombay Hook roads, the river banks are about 4 miles apart; thence they gradually narrow, and a flat, the least water on which is $3\frac{1}{2}$ fathoms at low water springs, extends about 8 miles, to the south point of Reedy island, when the river again deepens to 6 and 7 fathoms, which it maintains to abreast Delaware city, situated 53 miles from the entrance to the bay. Another 4-fathom flat then occurs for a distance of 5 miles, with an awkward bend in the river between shoals; thence the water deepens to 6, 7, and 8 fathoms, and so continues for 3 miles, in which space the largest vessels can anchor, just southward of the entrance to Christiana river, leading to Wilmington.

* After a continuance of N.E. winds, the current sets W.S.W. from Nantucket, and gradually veers to S.W., running $2\frac{1}{2}$ knots per hour. The pilots after a continuance of N.E. gales, often run 50 miles south of New York, to look out for ships, which have been set down in thick weather. W. W. Kiddle, R.N., Commanding *s.s. Bolivar*.

† See Admiralty charts:—Delaware river, Sheet 1, No. 2,563, scale, $m=0\cdot6$ of an inch and Sheet 2, No. 2,564, scale, $m=0\cdot9$ of an inch; and Great Egg island to Albemarle sound, No. 266, scale, $m=0\cdot16$ of an inch.

Delaware river now narrows to one mile, and the navigation becomes more intricate ; the depth varying from $3\frac{1}{2}$ to 6 fathoms, for 16 miles farther, where is situated 8 miles south-westward of the city of Philadelphia, Fort Mifflin Bar, with 18 feet water, the greatest depth over it at low water of ordinary spring tides. North-eastward of this bar, the water again deepens from 4, to 6 fathoms, and there is a depth of 9 fathoms opposite the quays of Philadelphia, distant 85 miles from the entrance to Delaware bay. The river is farther navigable with the tide, for vessels of 10 feet draught, as far as Trenton, the capital of the State of New Jersey, situated 30 miles north-eastward from Philadelphia.

At certain periods of the year, large quantities of ice float down the river.

The towns on the banks of Delaware river are Delaware city, Newcastle, Wilmington, and Philadelphia on the western bank, with Trenton and the populous village of Salem on the east or New Jersey shore. Newcastle has an extensive factory for steam engines, and is the terminus of the Frenchtown Railway. Wilmington, well situated between Christiana river and Brandywine creek, is the chief town of Delaware county. The ground on which it stands rises to a height of 112 feet above the river. It has numerous factories, as well as flour, and gunpowder mills.

PHILADELPHIA, is next to New York, the largest city in the United States, with a population in 1880, of 846,984. It stands on the west bank of Delaware river, and between it and the small river Schuylkill, rising gradually to a height of 64 feet above the level of high water. It has a river frontage of three miles, on the concave shore of a bend of the stream, which ensures it having deep water alongside its quays, the depth varying from 4 to 9 fathoms. The value of the Foreign exports and imports at the port of Philadelphia for the year 1878, amounted to 44,553,874 dollars, and 19,333,521 dollars, respectively. Here, is a navy yard of about 15 acres in extent, at the south end of the city, containing two floating docks, the one 282 feet long, 55 feet broad, and with a lifting capacity of 3,500 tons ; the other 175 in length, 46 feet in breadth, with a lifting capacity of 2,400 tons.

LIGHTS in DELAWARE BAY and RIVER.—Hereford Inlet.—This lighthouse stands on the north-east extreme of Five-mile beach, the south-west entrance point of Hereford inlet. The buff coloured tower surmounts the keeper's dwelling of a similar colour, and exhibits, from an elevation of 57 feet above high water, a *fixed red* light, visible 13 miles. From the south-westward, this light is obscured when bearing east of N.E. $\frac{1}{2}$ N.

Five-fathom bank light vessel, is moored S. by E. $\frac{1}{2}$ E. about $5\frac{1}{2}$ miles from the shoalest part of Five-fathom bank, and 2 miles S.E. by E. $\frac{1}{2}$ E. from a shoal having $3\frac{1}{2}$ fathoms water over it. The vessel is

painted straw colour, with the words *Five-fathom bank* on her sides, and exhibits two *fixed* white lights, one on each mast, at 40 and 45 feet above high water, visible 11 miles.

Fog Signal.—In thick weather a whistle is sounded, giving blasts of *four seconds* duration, at intervals of *one minute*.]

Five-fathom bank, N.E. light-vessel, is moored in 9 fathoms, bearing N.N.E., distant $9\frac{1}{2}$ miles from Five-fathom bank light vessel, and E. by S. $\frac{1}{2}$ S., 12 miles, from Hereford inlet lighthouse. The vessel is painted red, with the words *North-east end* in large black letters on her sides, and *No. 44* on the stern, and exhibits a fixed *red* light from the foremast head, and a fixed *white* light from the mainmast head; both lights are elevated 40 feet above the sea, visible in clear weather about 11 miles.

Fog signal.—During thick and foggy weather, a steam whistle will give two blasts of *four seconds* duration each, with an interval of *five seconds* between the blasts, every *two minutes*.

Cape May.—The lighthouse on cape May, the north-east entrance point of Delaware bay, is built of gray granite, 159 feet from the base to centre of lantern, and exhibits, at 167 feet above high water, a *flashing* white light, the intervals between the *flashes* being *thirty seconds*, and visible seaward 19 miles.

Fenwick Island.—This lighthouse is situated on the coast about 20 miles southward of cape Henlopen. It is coloured white, and exhibits, from an elevation of 86 feet above high water, a *fixed* white light visible 15 miles. From the southward the light is obscured, when bearing east of N. by E. $\frac{1}{4}$ E.

Cape Henlopen.—On cape Henlopen, the south entrance point of Delaware bay, is a white tower, 82 feet high, which exhibits, at an elevation of 128 feet above high water, a *fixed* white light, visible seaward 17 miles, between the bearings of N. by W., and S.E. There are large white sandhills close to this lighthouse.

Cape Henlopen beacon.—On the north extreme of cape Henlopen, and seven-eighths of a mile from that lighthouse, stands a white beacon on piles, which exhibits, at 45 feet above high water, a *fixed* white light, visible seaward 12 miles, between the bearings of N. by W., and E. by N. The beacon is in line between cape Henlopen lighthouse, and the pile lighthouse on Brandywine shoal.

Fog signal.—In foggy weather, a syren is sounded, giving blasts of *six seconds* duration, at intervals of *thirty-nine seconds*.

Delaware Breakwater (front).—The lighthouse on the north-west extreme of Delaware breakwater rising from the keeper's dwelling, is white, and exhibits, at 47 feet above high water, a *fixed* white light, varied by a *white flash every forty-five seconds*, and visible 12 miles.

Fog signal—A bell is sounded in foggy weather every *ten seconds*.

Delaware Breakwater Range (rear).—This lighthouse erected about 2 miles north-westward of Lewes, on the south side of the entrance to Delaware bay, is a black framework of iron, attached to the keeper's drab coloured dwelling, which, at an elevation of 108 feet above high water, exhibits a *fixed red* light, visible through an arc of 90 degrees from a distance of 16 miles.

This light in line with Delaware Breakwater front light bearing W. $\frac{1}{2}$ S., leads into Delaware bay.

Mispillion Creek.—At the mouth of this creek, situated about 15 miles north-west of cape Henlopen, is a buff coloured tower, connected with the keeper's dwelling of the same colour, which, from an elevation of 48 feet above high water, exhibits a *fixed* white light visible 11 miles.

Brandywine Shoal.—Seven-eighths of a mile north-west from the south-east extreme of Brandywine shoal, is an iron screw pile lighthouse, painted red, which exhibits, at 46 feet above high water, a *fixed* white light, visible 12 miles.

Fog signal.--A bell is sounded during foggy weather, giving *two strokes* in quick succession at intervals of *thirty seconds*.

Fourteen-foot bank light vessel is moored about 3½ cables eastward of the shoal of that name, in the depth of 6 fathoms. She has two masts, with a red hoop-iron daymark at each masthead, and is painted straw colour, with the words *Fourteen-foot bank* on each side; exhibiting, from elevations of 43 and 29 feet above high water, *two fixed* white lights, the highest of which is visible 11 and the other 10 miles.

Fog signal.—In foggy weather a bell and horn are sounded.

Maurice river lighthouse is erected on the east entrance point of the river of that name, situated on the east side of Delaware bay. The white tower surmounting the keeper's dwelling exhibits, at 48 feet above high water, a *fixed red* light visible 11 miles.

Egg island lighthouse is erected on the island of that name, situated on the east side of Delaware bay. The tower rising from the keeper's dwelling, is painted white, with black lantern, and exhibits, at 50 feet above high water, a *fixed* white light, visible 12 miles.

Cross ledge lighthouse is built on the south-east extreme of Cross ledge, situated on the east side of Main channel. The black lantern is attached to the roof of the keeper's one storey gray coloured dwelling, and exhibits, at an elevation of 38 feet above high water, a *flashing* white light, the intervals between the flashes being *fifteen seconds*, and visible 11 miles.

Fog signal.—In foggy weather a bell is sounded, giving *one stroke* every *ten seconds*.

Mahon river lighthouse is situated at the mouth of that river, on the west side of Delaware river. The tower, and keeper's two storey dwelling, to which it is attached, are both painted buff colour. From an elevation of 57 feet above high water, is exhibited a *fixed* white light visible 12 miles.

Ship John Shoal.—This lighthouse stands in the depth of 8 feet at low water, on Ship John shoal, situated on the east side of the channel. The lower part of the structure is of black, and the upper part of brown colour, surmounted by a black lantern, which, at an elevation of 53 feet above high water, exhibits a *fixed red* light, visible 12 miles.

Fog signal.—In foggy weather a bell is sounded, giving *three strokes* in quick succession at intervals of *forty-five seconds*.

Cohansey.—On Cohansey point, near the mouth of Cohansey creek, is a lighthouse on the keeper's dwelling, painted white, which exhibits, at 46 feet above high water, a *fixed* white light, visible 12 miles.

Bombay Hook.—On the north-west extreme of Bombay Hook island, situated on the west side of Delaware river, is a lighthouse surmounting the keeper's dwelling, painted white, which exhibits, at 46 feet above high water, a *fixed* white light, visible 12 miles.

Port Penn Range Beacon (front).—This lighthouse is situated on the west side of Delaware river, and about $1\frac{1}{2}$ miles southward from port Penn. It is coloured red, and surmounts a white building, exhibiting, at an elevation of 40 feet above high water, a *fixed* white light, visible when in, and nearly in line with the rear beacon.

Port Penn Range Beacon (rear).—This and the last-mentioned lighthouse, in line bearing N.W. $\frac{1}{4}$ N., serve as a leading mark for the portion of the channel between Bombay Hook Bar, and the line of Finn point range beacons in one. The rear beacon is painted black, and, at an elevation of 140 feet above high water, exhibits a *fixed* white light, visible when in, and nearly in line with the front beacon.

Reedy island.—On the southern extreme of Reedy island, situated on the west side of Main channel, is a drab tower, which exhibits, at 36 feet above high water, a *flashing* white light, the intervals between the flashes being *thirty seconds*, and visible 11 miles.

Fog signal.—A bell is sounded during foggy weather, at intervals of *fifteen seconds*.

Finn point Range Beacon (front).—The tower painted red, is attached to the keeper's dwelling painted white, and situated near Finn point, on the east side of Delaware river. It exhibits, at an elevation of 30 feet above high water, a *fixed* white light.

Finn Point Range Beacon (rear).—This light tower is coloured black, and exhibits, at an elevation of 105 feet above high water, a *fixed* white light.

These lighthouses near Finn point are for the purpose of a leading mark through the portion of the channel, eastward of Reedy island, and the lights are visible only, when in, and nearly in line with each other.

Newcastle Range Beacon (front).—This lighthouse is situated about $1\frac{1}{2}$ miles south-westward of the town of Newcastle, on the west side of Delaware river. It is painted white, and attached to the keeper's dwelling of the same colour, exhibiting, at an elevation of 20 feet above high water, a *fixed* white light.

Newcastle Range Beacon (rear).—The tower is attached to the white dwelling with a red roof, and exhibits, at an elevation of 90 feet above high water, a *fixed* white light.

These lighthouses near Newcastle are for the purpose of a leading mark through a portion of the channel eastward of Pea Patch island, and the lights are visible only when in, and nearly in line with each other.

Deep Water Point Range Beacon (front).—This lighthouse is situated on the east side of Delaware river, and about half a mile southward of Deep Water point. The white tower is attached to the keeper's dwelling of the same colour, and exhibits, at an elevation of 25 feet above high water, a *fixed* white light.

Deep Water Point Range Beacon (rear).—The tower is black, and exhibits, from an elevation of 98 feet above high water, a *fixed* white light.

These lighthouses near Deep Water point serve as a leading mark through a portion of the channel between Bulkhead shoal, and the shoal water extending from Penn Neck, the lights being visible only, when in, and nearly in line with each other.

Christiana.—At the entrance to Christiana river, on the west side of Delaware river, is a white lighthouse, rising from the keeper's dwelling, which exhibits, at 48 feet above high water, a *fixed* white light, visible 12 miles. From the southward this light is not visible when bearing eastward of N.N.E.

Cherry Island Range Beacon (front).—This lighthouse is situated $2\frac{1}{4}$ miles north-eastward from the mouth of Christiana river, and on the north-west side of Delaware river. The tower painted white, stands on a pier near the low water mark, and exhibits, from an elevation of 34 feet above high water, a fixed white light.

Fog signal.—In foggy weather a bell is sounded, giving a *volley of strokes* every *fifteen seconds*.

Cherry Island Range Beacon (rear).—The white tower is attached to the keeper's two storey dwelling of the same colour, exhibiting, at an elevation of 120 feet above high water, a *fixed* white light. This and the front beacon, when in line bearing N.N.E., lead through the artificial channel across Cherry island Flats.

Schooner Ledge Range Beacon (front).—This lighthouse stands at the mouth of Crum creek, near the Lazaretto on the north-west side of Delaware river. The red tower surmounts the keeper's white dwelling, and exhibits, at an elevation of 37 feet above high water, a *fixed* white light, visible over an arc of 180 degrees.

Schooner Ledge Range Beacon (rear).—The tower is painted black, and exhibits, at an elevation of 100 feet above high water, a *fixed* white light, visible over an arc of 120 degrees.

This and the front beacon when in line, lead through the deepest water on Schooner ledge.

Tinicumb Island Range Beacon (front).—This lighthouse, which also serves as the front Mifflin Bar leading light, forms one of three beacon lights, situated near the town of Billingsport, on the south-east side of Delaware river. The white square tower is attached to a white two-storey dwelling, and exhibits, at an elevation of 37 feet above high water, a *fixed* white light, visible over an arc of 180 degrees.

Tinicumb Island Range Beacon (rear).—The black light-tower, exhibits, at an elevation of 106 feet above high water, a *fixed red* light, visible over an arc of 120 degrees. This and the preceding lighthouse in line, lead through the portion of the channel southward of Tinicum island.

Fort Mifflin Bar Cut Range Beacon (rear).—This is the westernmost of the three lighthouses near the town of Billingsport. The white square tower is attached to a dwelling of the same colour, and exhibits, from an elevation of 60 feet above high water, a *fixed red* light, visible over an arc of 120 degrees. This beacon, in line with Tinicum island front beacon above mentioned, leads over Fort Mifflin bar.

Fog signal.—On the south-east bank of the channel, and nearly abreast of Fort Mifflin dock, a bell is sounded in foggy weather, giving a *single stroke* every *fifteen seconds*, the *eighth stroke* being followed by an interval of *forty-two seconds*.

Horse-shoe Lower Range is the name given to a group of three beacon lights, situated about half a mile north-east of fort Mifflin, on the north-west side of Delaware river. The rear or western beacon is white, and shews a *fixed* white light, and eastward of it are the two front beacons,

the southernmost of which is white, and exhibits a *fixed* white light, the northern one being red, and exhibiting a *fixed red* light. The white lights in line lead through the portion of the channel southward of League island; the rear light and front red light in line mark the southern limit of the channel south-eastward of Greenwich point, the fairway marks for which are the following:—

Horse-shoe Upper Range.—This group is similar to, and partly connected with, that described above, being situated on the shore of Howell cove, on the south-east side of Delaware river. The rear or south-western beacon is white, and shows a *fixed* white light, and north-eastward of it are the two front beacons, the easternmost of which is white, and exhibits a *fixed* white light, the western one being of red colour, and showing a *fixed red* light.

The white lights in line, lead through the portion of the channel south-eastward of Greenwich point; the rear light and front *red* light in line, mark the eastern termination of the channel, indicated by Horse-shoe Lower Range lights described above.

Schuylkill Range Beacon (front).—This and the rear beacon are erected on the west side of League island, and when in line lead into Schuylkill river. The front beacon is white, and exhibits, at an elevation of 17 feet above high water, a *fixed* white light, visible when in, and nearly in line with the rear beacon.

Schuylkill Range Beacon (rear).—This white square tower exhibits, at an elevation of 33 feet above high water, a *fixed* white light, visible when in, and nearly in line with the front beacon above mentioned.

DANGERS in entering DELAWARE BAY.—Five-fathom bank., is the name given to a shoal of not more than 5 fathoms over it, $6\frac{1}{2}$ miles long in a north and south direction, with a maximum breadth of 4 miles, near its northern extreme.

The shoalest part, with 13 feet least water on it, is known as Five-fathom shoal, and is situated near the southern extreme, bearing E. by S. $\frac{1}{4}$ S., distant $15\frac{1}{2}$ miles from cape May lighthouse.

A black buoy, placed in 3 fathoms, marks the north-east extreme of Five-fathom shoal.

The depth of only $3\frac{1}{2}$ fathoms will be found near the north and north-east extremes of Five-fathom bank, bearing respectively N. by E., and N.E. $\frac{1}{4}$ N., distant 5 miles from the shallowest part of Five-fathom shoal.

A shoal, with $3\frac{1}{2}$ fathoms water on it, is situated N.W. $\frac{1}{4}$ W. $2\frac{8}{10}$ miles from Five-fathom bank light vessel, and S. by W. $\frac{1}{4}$ W., $3\frac{1}{2}$ miles from Five-fathom shoal black buoy.

McCries shoal is one mile long E. by N. and W. by S., and half a mile broad, its shoalest part, with 17 feet water over it, bearing S.E. $\frac{3}{8}$ S., distant 7 miles from cape May lighthouse. It is marked by a *red* buoy placed on its south-east edge.

A patch with 3 fathoms water on it, lies W. by N. distant $1\frac{3}{4}$ miles from McCries shoal buoy.

Eph shoal with 5 feet least water, lies about a mile from the shore of cape May, its east and west extremes being marked by red and black horizontally striped buoys, bearing respectively E. by S. $\frac{3}{4}$ S., distant $3\frac{1}{4}$, and S.E. by E. $\frac{1}{4}$ E. $1\frac{3}{4}$ miles from cape May lighthouse.

OVERFALLS SHOALS, is the name given to the large extent of shallow water extending S.W. by S. 5 miles from cape May.

North shoal, with 4 to 12 feet water upon it, forms the north-east portion of Overfalls shoals, and is separated from cape May by deeper water, known as cape May channel.

A black buoy is placed in 4 fathoms, southward of the east extreme of north shoal, named Somers shoal buoy, bearing S. by E. $\frac{1}{4}$ E., distant $3\frac{3}{4}$ miles from cape May lighthouse.

Middle shoal, with 10 feet least water on it, forms the middle part of Overfalls shoals, and is separated from North, and South shoals, by deeper water.

South shoal, is the name given to the shallowest portion of the southern part of Overfalls shoals. The least water on it is 11 feet, and not more than 18 feet will be found S.E. $\frac{3}{4}$ S. $2\frac{1}{4}$, and as little as 13 feet, S.W. $\frac{1}{2}$ S., $1\frac{1}{2}$ miles from South shoal.

At the latter position a red buoy is placed, bearing N.E. $\frac{1}{2}$ E., distant $4\frac{3}{10}$ miles from cape Henlopen beacon; while near the former, is moored close to the depth of 15 feet, a red and black horizontally striped buoy, bearing N.E. by E. $\frac{1}{2}$ E. $6\frac{1}{4}$ miles distant from cape Henlopen lighthouse.

An automatic whistling buoy, painted red, and with the figure 4 upon it, is placed in $6\frac{1}{2}$ fathoms water, southward of Overfalls shoals, bearing N.E. by E. from cape Henlopen lighthouse and E. by N. $\frac{1}{4}$ N. from Delaware breakwater lighthouse.

On Overfalls shoals there are in many places, breakers, and strong tide rips.

A red buoy marked No. 2, bearing S.W. by S., distant three-quarters of a mile from cape May lighthouse, marks the south extreme of shoal water, extending from the shoal near that lighthouse.

East-north-east, or round shoal with 3 feet, and Mummy shoal with 9 feet least water on it, are situated westward of cape May, and separated from each other, by a narrow passage, known as Blunt channel.

Near the south extreme of the former, and westernmost shoal is placed a buoy, marked with black and white perpendicular stripes, bearing SW. by W. $\frac{1}{2}$ W. distant $2\frac{1}{2}$ miles from cape May lighthouse. This buoy is placed in the centre of a narrow passage, named Through channel, which divides East-north-east shoal, from Overfalls shoals.

The south extreme of Mummy shoal, is marked by a black buoy marked No. 1, bearing W. by S. $\frac{1}{4}$ S. $1\frac{2}{3}$ miles distant from cape May lighthouse.

Crow shoal, with 7 feet least water, lies parallel to and about $1\frac{1}{2}$ miles distant from the west shore of cape May. Its south extreme is marked by a red buoy, marked No. 4, bearing W. by N. $\frac{1}{4}$ N. distant $1\frac{6}{10}$ miles from cape May lighthouse. A shallow passage, known as Ricord channel, separates the south-west part of Crow, from Mummy shoal ; in the north-west entrance to which, is moored a black and white perpendicularly striped buoy, bearing N.W. by W. $\frac{3}{8}$ W., distant $2\frac{9}{10}$ miles from cape May lighthouse.

Brandywine shoal, well marked by its lighthouse, is $3\frac{6}{10}$ miles long in a N. by W. $\frac{3}{4}$ W. direction, and one-third of a mile broad. Its shoalest part is awash at the lowest tides, and the north and south extremes are marked by red buoys, bearing respectively N. by W. $\frac{1}{2}$ W. distant $2\frac{9}{10}$ miles, and S.E. by S. 8 cables from Brandywine shoal lighthouse.

Brown shoal, with 8 feet least water, is $1\frac{6}{10}$ miles long in a similar direction, and narrow. Its south extreme is marked by a black buoy, bearing S. $\frac{1}{2}$ W. distant $3\frac{1}{3}$ miles from Brandywine shoal lighthouse.

The Shears, is the name given to a large flat with depths over it varying from 6 to 10 feet, extending nearly 4 miles from the shore of the bight north-west of cape Henlopen. Its eastern extreme is marked by a black buoy placed in 3 fathoms, bearing N. by W. $\frac{1}{2}$ W. distant $2\frac{1}{10}$ miles from cape Henlopen beacon. From this buoy the north-east edge of the shears trends N.W. by N. for $1\frac{1}{2}$ miles with the depth of from 10 to 12 feet.

Hen and Chickens shoal with 5 feet least water on it, extends S.S.E. $\frac{1}{2}$ E. $3\frac{2}{10}$ miles from the north extreme of cape Henlopen.

A black buoy marks the south-east extreme bearing S.E. $\frac{3}{4}$ S. $2\frac{1}{2}$ miles distant from cape Henlopen lighthouse.

Not more than $3\frac{1}{2}$ fathoms will be found S. by E., three-quarters of a mile from this buoy.

A black and white perpendicularly striped buoy is placed in 18 feet water, marking the centre of a narrow channel between Hen and Chickens shoal,

and cape Henlopen. The buoy bears E. $\frac{1}{2}$ S., distant 3 cables from cape Henlopen beacon.

Directions for entering Delaware bay.—The automatic whistling buoy situated south-westward of Overfalls shoals, bears W. $\frac{1}{2}$ N. distant 19 $\frac{1}{2}$ miles from Five-fathom bank light vessel. In clear weather, by day or night, this course may be steered, as far as the line of Delaware breakwater range beacons in one, bearing W. $\frac{1}{2}$ S. If the course has been made good, this position will be about 3 $\frac{1}{2}$ miles eastward from the automatic whistling buoy; whence a heavy draught vessel by day, and all vessels by night, should steer W. $\frac{1}{2}$ S. for Delaware breakwater range beacons in line, until cape May lighthouse bears N.N.E. $\frac{1}{2}$ E., in line with the automatic buoy, the latter being distant, two-thirds of a mile. A N.W. course for about 4 $\frac{1}{2}$ miles, will lead to the line of cape Henlopen lighthouse and beacon in one bearing S. $\frac{1}{2}$ E.

Keep these lights in one, steering N. $\frac{1}{4}$ W., being careful, especially on the flood, not to pass northward of this line. When within 1 $\frac{1}{2}$ miles from Brandywine shoal lighthouse and Fourteen-foot bank light vessel bears N.N.W. she may be steered for on that bearing.

The above courses lead 1 $\frac{3}{4}$ miles southward of the red buoy on McCries shoal; one mile southward of the red and black horizontally striped buoy, on the south-east side of South shoal of Overfalls shoals; half a mile southward of the automatic buoy; a quarter of a mile eastward of Brown shoal buoy, and half a mile south-westward from Brandywine shoal lighthouse.

A vessel of moderate draught, in the day-time may from the position 3 $\frac{1}{2}$ miles eastward from the automatic buoy, if the latter be visible, continue the W. $\frac{1}{2}$ N. course to this buoy with not less than 4 $\frac{1}{2}$ fathoms; pass close south and west of it, and steer N.N.W. for Fourteen-foot bank light vessel, passing one mile north-eastward of Brown shoal buoy, and half a mile south-westward of Brandywine shoal light vessel.

From the southward.—With Fenwick island light bearing W. $\frac{1}{2}$ S. distant 12 miles, in line with the red and black horizontally striped buoy of Fenwick island shoal, distant 5 $\frac{1}{2}$ miles, and depth of water 15 fathoms, the course is N.N.W., for the automatic whistling buoy in the entrance. Having arrived at the line of Delaware breakwater range lights in one, bearing W. $\frac{1}{2}$ S., proceed as directed from the eastward.

In thick weather, a vessel when approaching the entrance, should not shoal to less than 15 fathoms.

Anchorage may be obtained in Breakwater harbour, formed between the breakwater and the bold north shore of cape Henlopen, by steering for Delaware breakwater range beacon lights in line, bearing W. $\frac{1}{2}$ S., pass-

ing southward of the east extreme of the breakwater, and anchoring in 3½ to 4 fathoms with the light on the breakwater, bearing N. by W. The holding ground is excellent in every part of the harbour. Chains and anchors can be procured on the breakwater, and ship's stores generally at the town of Lewes.

DANGERS AND BUOYS between BRANDYWINE SHOAL and BOMBAY HOOK ROADS. East side of Main channel.—**Miah Maull shoal**, with 11 feet least water on it, has its south-west side marked by a red buoy, placed in 4 fathoms, and bearing N. by W. ¼ W., distant 3½ miles from Fourteen-foot bank light vessel, and S.S.E. ¼ E., 3½ miles from Cross ledge lighthouse.

Cross ledge, with only one foot water over its shoalest part, is within the depth of 12 feet, 3½ miles in length, and in addition to the lighthouse erected upon the southern portion, has its western edge marked by a red buoy (No. 12), placed in 3½ fathoms, and bearing N.W. ½ N., distant 2¼ miles from Cross ledge lighthouse.

No. 14 buoy, coloured red, bearing S.E. ¾ S., distant 4½ miles from Ship John shoal lighthouse, is placed in 15 feet water, 6 cables W.S.W. from a shoal with 2 feet water on it.

Ship John Shoal is well marked by the lighthouse of that name, erected on its western edge, and bearing S.S.W. ¼ W. distant 2¼ miles from Cohansay lighthouse.

No. 16 buoy of red colour, is moored 5½ miles northward of Ship John lighthouse; bearing E. by N. ¼ N. distant 2½ miles from Bombay Hook lighthouse.

West side of Main channel.—**Fourteen-foot bank**, with 19 feet water over it, has the light vessel of that name moored 3 cables from the eastern side, and a black buoy placed in 20 feet on the northern portion bearing west, distant 4 cables from the light vessel.

Joe Flogger shoal, is the name given to a narrow bank 15 miles long in a N.N.W. ¼ W. direction and nearly dry in places at low water, the eastern side of which is marked by the following buoys:—

No. 11, painted black, placed in 18 feet on its south extreme, and bearing N.W. by W. ¼ W. distant 1½ miles from Fourteen-foot bank light vessel.

Swash buoy, of the same colour, placed in 4 fathoms, bearing N.W. by N. distant 4½ miles from the same light vessel.

No. 13, painted black, placed in 18 feet on the north extreme, and bearing S. $\frac{3}{4}$ E., distant $2\frac{1}{10}$ miles from Ship John shoal lighthouse.

One red, and two black buoys, will be seen situated westward of Joe Flogger shoal, marking the limits of Blake channel, contained between Joe Flogger shoal and the shoals extending from the western shore of Delaware bay.

Bombay Hook bar, with 4 to 5 feet water on its eastern edge, extends one mile eastward from Bombay Hook point. A black buoy, marked No. 15, is placed in 3 fathoms near the east side, bearing W. by N. $\frac{3}{4}$ N. distant $1\frac{9}{10}$ miles from Ship John shoal lighthouse.

In addition to the above-mentioned buoys, there are placed in the fairway of the channel two buoys, painted black and white in perpendicular stripes, the southernmost named Cross ledge mid-channel buoy, bearing S. $\frac{1}{2}$ W. distant $1\frac{3}{10}$ miles from Cross ledge lighthouse; the other known as buoy of the Middle, bearing N.W. $\frac{1}{2}$ N. distant $3\frac{7}{10}$ miles from the same lighthouse.

A wreck buoy is moored nearly in the fairway, in the northern part of Bombay Hook roads, bearing N.E. $\frac{1}{2}$ E. distant 2 miles from Bombay Hook lighthouse.

Directions from Brandywine shoal to Bombay Hook roads.—Continue the N.N.W. course for Fourteen-foot bank light vessel, and passing eastward of her, steer N.N.W. $\frac{1}{2}$ W. for Cross ledge mid-channel buoy. Pass on the same side of this buoy, and steer N.N.W. $\frac{1}{2}$ W. for buoy of the Middle, arriving at which, the course for Bombay Hook roads is N.W. $\frac{3}{4}$ N., where anchorage may be obtained with Bombay Hook point bearing S. by E., and Bombay Hook lighthouse W. by N., or the course may be continued until Port Penn range beacon lights are seen in line bearing N.W. $\frac{3}{4}$ N., when they should be steered for, following the directions hereafter given.

DANGERS between BOMBAY HOOK ROADS and CHERRY ISLAND FLATS.—**East side of the channel:**—**Baker shoal** with 8 feet least water on its southern extreme extends $1\frac{1}{2}$ miles westward of the shore between Stony and Alloway points. A red buoy is placed in $4\frac{1}{2}$ fathoms near the west extreme, bearing S.E. $\frac{1}{2}$ E. $1\frac{9}{10}$ miles from Port Penn range beacon (front).

Shoal water extends $1\frac{1}{2}$ miles from the shore of Salem cove, and one mile westward of the coast of Penn Neck; the latter being marked by two red buoys, numbered 2 and 4, bearing N.W. by W. $\frac{1}{2}$ W. distant $1\frac{3}{10}$ and N.W. $\frac{1}{2}$ N. $2\frac{2}{10}$ miles, respectively from Finn point range beacon (front).

Cherry island Flats, with 8 feet least water over them, occupy the centre of Delaware river, and extend from abreast of Christiana lighthouse to 3 miles north-eastward of the same. Its north-east and south-west extremes, are each marked by a red and black horizontally striped buoy, placed in 3 fathoms, and bearing respectively N.E. $\frac{1}{2}$ E., distant $2\frac{9}{10}$ miles, and E. by S., 6 cables from Christiana lighthouse. The western side of the central portion of the shoal, is marked by a red buoy (No. 26) bearing N.E. by E., distant $1\frac{3}{4}$ miles from the same lighthouse.

The eastern side of the middle portion of this shoal, is marked by a black buoy, in connection with the passage eastward of Cherry island Flats.

West side of the channel.—No. 17 black buoy is placed in 3 fathoms, bearing South, distant $8\frac{1}{2}$ cables from Reedy island lighthouse and E.S.E. $1\frac{1}{10}$ miles from Port Penn range beacon (front).

Pea Patch island is situated midway between the city of Delaware, and Finns point, the south extreme of Penn neck. The east and north-east sides of Pea Patch island are steep to, but in all other directions, shoal water extends for a considerable distance, separated from the west shore of Delaware river by a buoys channel of 3 fathoms.

A black and red horizontally striped buoy is placed on the eastern edge of the bank extending to the southward, and near the depth of 13 feet bearing S.S.E., distant $1\frac{1}{4}$ miles, from the south extreme of Pea Patch island.

Bulkhead shoal extends in a N. by W., and afterwards N.E. by N. direction for a total distance of 3 miles from the north extreme of Pea Patch island, its eastern side being marked by the following buoys:—

No. 1 painted black, bearing N. by W., distant 6 cables from the north extreme of Pea Patch island.

No. 3 of the same colour, bearing N. $\frac{3}{4}$ W., distant $1\frac{7}{10}$ miles from the same extreme.

The north-east termination of Bulkhead shoal, is marked by a red and black horizontally striped buoy, bearing S.E. by E. $\frac{3}{4}$ E., distant $1\frac{1}{4}$ miles from Newcastle range beacon (front).

A bank extends half a mile from the shore, between the town of Newcastle, and the mouth of Christiana river, and is marked by a black buoy (No. 23) placed in about 14 feet of water, bearing S.W. by W. $\frac{3}{4}$ W., distant $1\frac{8}{10}$ miles from Deep water point range beacon (front).

In addition to these buoys, marking dangers in Main channel, a buoy painted with black and white vertical stripes is placed in mid-channel

south-eastward of the north-east portion of Bulkhead shoal, and bearing S.E. $\frac{1}{2}$ S., distant $1\frac{3}{10}$ miles from Newcastle range beacon (front).

Directions from Bombay Hook roads to Cherry island Flats.—Proceed for Fort Penn range beacon lights in line bearing N.W. $\frac{3}{4}$ N., until Finn point range beacons are seen in one bearing N. by E. $\frac{1}{2}$ E. Steer now for these lights, until Reedy point bears W. by S., when the lighthouses known as Newcastle range beacons, will be seen in line bearing N.N.W. Proceed for these lights in line, passing between the southern part of Bulkhead shoal, and the shoals westward of Penn Neck, until abreast of No. 4 buoy of the latter, when the course should be altered to the northward and north-eastward, in order to bring Deep Water point range beacons in line bearing N.E. $\frac{1}{4}$ E. Steer for these lighthouses, passing close to the fair way buoy, until No. 23 black buoy is a little abaft the beam, and the lighthouses known as Cherry island range beacons, are in line bearing N.N.E.

Proceed for the latter lights crossing the south-west part of Cherry island Flats, through the artificial channel with a depth of 24 feet. When nearly abreast of No. 26 buoy of Cherry island Flats, steer N.E. $\frac{1}{2}$ N. and proceed as hereafter directed.

Anchorage.—Reedy island harbour, formed between that island and the western shore, is much frequented, especially in winter when the ice is drifting. It is entered from the southward, care being taken to pass westward of a shoal spit, which extends southward half a mile from the south extreme of Reedy island. A North course leads into the harbour, where anchorage may be obtained in 4 to 6 fathoms, good holding ground abreast the piers.

DANGERS between CHERRY ISLAND FLATS and PHILADELPHIA.—**Marcus Hook Bar**, the central portion of which is awash at low water springs, extends 4 miles in a west south-westerly direction from Tonkin island and is marked by two red buoys, numbered 28 and 30, bearing respectively N.E. $\frac{1}{2}$ E., distant $2\frac{3}{10}$ and N.E. $\frac{1}{2}$ E. $3\frac{4}{10}$ miles from Cherry island range beacon (front).

Chester island Bar, is the name given to three low islands and the shoal water surrounding them, situated between Tonkin and Tinicum islands. Its north-east and south-west extremes are marked by No. 34 and No. 32 red buoys, bearing respectively S. $\frac{1}{2}$ W., distant 7 cables, and S.W. by W. $2\frac{9}{10}$ miles from Schooner ledge range beacon (front).

A patch of 16 feet water, lies W. by S. $\frac{3}{4}$ S., distant 3 cables from No. 32 buoy.

Schooner ledge, with 18 feet water over rock, is situated about half a mile westward from the south-west extreme of Chester island Bar. Its north-east and south-west sides, are each marked by a red and black horizontally striped buoy, and a black buoy is placed eastward $1\frac{1}{2}$ cable from the rock.

Schooner ledge range beacons in line, lead across the rock in the deepest water.

Shoal water extends 4 cables westward, from the west extreme of Tinicum island, and is marked by a red and black horizontally striped buoy, bearing S.W., distant 6 cables from Schooner ledge range beacon (front).

Fort Mifflin Bar, is the name given to the shoal water, extending from the east extreme of Tinicum island to Red bank and Eagle point, on the south-east shore of Delaware river, and nearly opposite to League island. The artificial channel over the bar known as Fort Mifflin Bar Cut, has a red buoy placed on its eastern, and a black buoy on its western side, the former bearing S.W. by S. distant 8 cables, and the latter S.W. $\frac{1}{4}$ S., one mile from the south angle of fort Mifflin.

A red buoy is placed in the entrance to Schuylkill river, in connection with the navigation of the channel thereinto.

Horse-shoe shoal extends $4\frac{1}{2}$ cables southward from the bend of the north shore of Delaware river, between the eastern part of League island and Greenwich point. Its central portion is awash at low water, and a black buoy is placed on the southern edge of the shoal bearing N.W. by W. $\frac{3}{4}$ W., distant 6 cables from the western entrance point of Big Timber creek. W. by N. distant three-quarters of a mile from this buoy, is moored on the western part of the shoal, a red and black horizontally striped buoy, known as New Ironsides buoy.

A shoal, the least water on which is 17 feet, lies $1\frac{1}{4}$ cables eastward from the southern wharves of the city of Philadelphia, and half a mile northward from Greenwich point. It is not buoyed.

Wind-mill island is situated between the northern part of Camden and the city of Philadelphia. Shoal water extends from the southern extreme of the island for nearly a mile, the south extreme being marked by a red buoy (No. 38), bearing S.W. distant $2\frac{1}{2}$ cables from the southern wharf on Kaighn point.

Directions from Cherry island Flats to Philadelphia.—Continue the N.E. $\frac{1}{2}$ N. course between Cherry island Flats and the west side of Delaware river, until about one-third of a mile north-westward of No. 28 buoy of Marcus Hook Bar. Schooner ledge range

beacons will now be visible in line, and should so be steered for passing northward of Marcus Hook Bar, and through the deepest water over Schooner ledge. After passing the town of Chester, the pair of beacons known as Tinicum island range beacons (front light red, and rear light white) situated near Billingsport, will be visible, and should be steered for in line, passing northward of No. 34 buoy of Chester island Bar. When the western white beacon, shewing a red light, and known as Fort Mifflin Bar Cut range (rear), comes in sight, the course should be altered two points to the northward, and kept until the same beacon is in line with Tinicum island range beacon (front). These lighthouses in line, lead across Fort Mifflin Bar in the deepest water, and as far north-eastward as the line of the two white lights of the three beacons, known as Horse-shoe Lower Range, situated half a mile north-east of fort Mifflin.

These white lights should now be kept in line astern, until the red light of the three beacons known as Horse-shoe Upper Range, situated in Howell cove, comes in line with the rear white beacon light. At this intersection the course should be altered 3 points to the northward, and kept for about 6 cables, until the front and rear white lights are in line, when they should be so kept astern, leading in the deepest water past Greenwich point. A heavy draught vessel should now keep nearest the eastern shore of Delaware river, until Canal Basin on the western side bears W. by N., whence the latter shore should be kept on board to the City of Philadelphia.

LIFEBOATS.—South-east coast of New Jersey.—Life-boats are stationed on this coast, at short intervals between cape May and Little Egg harbour.

East coast of Delaware.—Life-boats are stationed at cape Henlopen, Rehoboth beach, and Indian river inlet.

Buoys.—From seaward, red buoys mark the starboard; and black buoys the port side of the channel. Those coloured red and black in horizontal stripes, mark dangers, on either side of which there is a passage. Black and white perpendicularly striped buoys are placed in the fairway and may be closely approached.

PILOTS for Delaware bay.—Delaware and cape May pilot vessels cruise about 30 miles from capes May and Henlopen.

Tides, and tidal streams, in Delaware bay and river.—It is high water, full and change, at Delaware breakwater, cape Henlopen, at 8h. ; springs rise $4\frac{1}{2}$ feet, and neaps $3\frac{1}{2}$ feet. At cape May landing, at 8h. 19m. ; springs rise 6 feet, and neaps 5 feet. At Mahon river lighthouse, at 9h. 37m. ; springs rise $6\frac{1}{2}$ feet, neaps 6 feet. At New Castle, at

11h. 16m.; springs rise $6\frac{1}{4}$ feet, and neaps $5\frac{1}{4}$ feet. At Philadelphia, at 1h. 22m.; springs rise 7 feet, and neaps $5\frac{3}{4}$ feet.

At $3\frac{1}{2}$ miles south from McCries shoal, the maximum velocity of the flood or ingoing stream is nine-tenths of a knot per hour, in a W. $\frac{1}{2}$ N. direction; that of the ebb, nine-tenths of a knot, in an E. by S. direction.

At a position E. $\frac{3}{4}$ S. distant 6 miles from cape Henlopen lighthouse, the flood and ebb streams at the period of their greatest strength, run respectively N.W. by W. one knot, and S. by E. $\frac{1}{2}$ E. at the same rate.

At 3 miles N.E. $\frac{1}{2}$ E. from cape Henlopen beacon, these streams set respectively W. by N. $\frac{3}{4}$ N. $1\frac{9}{10}$ miles, and S.E. by S. 2 miles per hour.

East, distant one mile from Brown shoal buoy, the flood and ebb streams run during their greatest strength, N. by W. $\frac{1}{2}$ W. $1\frac{1}{2}$ knots and S.S.E. $1\frac{1}{2}$ knots per hour respectively.

The depths mentioned, are above the level of low water *ordinary spring* tides. The *lowest* spring tides, fall half a foot lower.

COAST between DELAWARE and CHESAPEAKE BAYS.—This low coast is broken by the entrances to several shallow inlets, which from an almost continuous chain at the back of the beach, form cape Henlopen to cape Charles. The portion of the coast between Fenwick and Paramore islands, is fronted by numerous shoals, with depths on them varying from 2 to 5 fathoms, the latter depth being found as far as 10 miles from the shore.

LIGHTS.—Winter Quarter shoal light vessel.—This light vessel is moored S.E. by E. $\frac{1}{2}$ E., 2 miles distant from the shoal of that name, and $8\frac{1}{2}$ miles from the coast of Virginia. The vessel is painted red, with the words Winter Quarter on each side, and exhibits, from an elevation of 38 feet above high water, a *fixed red* light, visible 11 miles.

Fog signal.—In foggy weather, a bell and horn are sounded.

Assateague lighthouse, is situated about 2 miles north-eastward from the south-west point of Assateague island, and is painted red, exhibiting at an elevation of 153 feet above high water, a *fixed white* light, visible 18 miles. From the south-westward, the light is obscured when bearing eastward of N.E.

DANGERS between the approaches to DELAWARE and CHESAPEAKE BAYS.—Fenwick island shoal.—With 15 feet least water over it, bears East, distant 6 miles from Fenwick island lighthouse and S. by E. $\frac{3}{4}$ E. $20\frac{1}{2}$ miles from cape Henlopen lighthouse. It is marked by a red and black horizontally striped buoy.

A patch of $4\frac{3}{4}$ fathoms, bears E.N.E. distant $2\frac{1}{3}$ miles from the shoalest part of Fenwick island shoal, and one with $3\frac{1}{2}$ fathoms water on it, lies S. by E. $\frac{1}{4}$ E., $1\frac{3}{4}$ miles from the same.

Isle of Wight shoal, with 3 fathoms water, lies 4 miles S. $\frac{1}{4}$ E. from the centre of Fenwick island shoal, and S.E. $\frac{5}{8}$ E., distant 7 $\frac{1}{2}$ miles from Fenwick island lighthouse. It is marked by a buoy painted red and black with horizontal stripes.

The south-east sides of these shoals are steep to.

A shoal with 4 $\frac{1}{2}$ fathoms water on it, is situated S. by E. $\frac{1}{4}$ E. distant 6 miles from Isle of Wight shoal.

Little Gull bank, with 12 feet least water, lies with its north-east extreme, 2 $\frac{1}{2}$ miles off shore, and bearing south, distant 8 $\frac{1}{2}$ miles from Fenwick island lighthouse.

Great Gull bank, with 21 feet, lies 3 $\frac{3}{4}$ miles off shore, bearing south, distant 12 miles from the same lighthouse.

Winter Quarter shoal, is 1 $\frac{1}{2}$ miles long, and one-third of a mile wide in an E. by N. $\frac{3}{4}$ N. and W. by S. $\frac{3}{4}$ S. direction, with as little as 12 feet water, in several places. It is 6 $\frac{1}{4}$ miles from the nearest land, with 10 fathoms between it and the shore, and bears E. by N. $\frac{1}{2}$ N., distant 11 $\frac{1}{4}$ miles from Assateague lighthouse, and N.W. by W. $\frac{1}{2}$ W., 2 miles from Winter Quarter shoal light vessel.

Approaching it from seaward, the soundings change suddenly from 9 to 4 fathoms, and then to 2 fathoms. This is a dangerous shoal, as it lies directly in the track of vessels. The sea breaks upon it in heavy weather.

A buoy, painted red and black in horizontal stripes, is placed near the shoalest part.

A bank with 3 $\frac{1}{2}$ fathoms least water on it, lies N.E. $\frac{1}{4}$ N., distant 8 $\frac{1}{2}$ miles from the shoalest part of Winter Quarter shoal; and one of 5 $\frac{1}{2}$ fathoms, N.E. $\frac{3}{4}$ E., 4 miles from the light vessel of that name.

A shoal of 4 $\frac{1}{2}$ fathoms, bears S. by W. $\frac{1}{8}$ W., distant 5 miles from the same light vessel.

Black-fish banks, with 3 $\frac{1}{4}$ to 3 $\frac{3}{4}$ fathoms over them, are situated south-eastward of Chincoteague shoals, and the south extreme of Assateague island. They extend in a N.E. by E. direction 7 $\frac{1}{2}$ miles, the north-east extreme bearing E. $\frac{3}{4}$ S., distant 7 $\frac{1}{2}$ miles from Assateague lighthouse.

Thomas shoal or Turner Lump, are the names given to a spot with 8 feet water on it, forming the south extreme of Chincoteague shoals. A black can buoy is placed in 4 fathoms on the eastern edge, bearing S. $\frac{1}{8}$ E., distant 5 miles from Assateague lighthouse.

A shoal with 4 fathoms water over it, lies $1\frac{1}{2}$ miles eastward of Black-fish banks, bearing S.E. by E. $\frac{3}{8}$ E., distant 8 miles from the same lighthouse.

Paramore banks, with $3\frac{1}{2}$ fathoms least water over them, are about 5 miles in extent in a N.E. and S.W. direction, the north-east and south-west extremes, bearing respectively E. $\frac{3}{4}$ S. distant 7 miles, and S.E. $\frac{1}{2}$ S., 5 miles from the north-east extreme of Paramore island. This concludes the shoalest and most outlying dangers, between Fenwick and Paramore islands, but as there are many other shoal places, between them and the shore, strangers should avoid the entire locality, by passing eastward of it, and in thick weather not standing into less than 15 fathoms.

Current.—The general set of the current is to the southward and westward.

Lifeboats are stationed at Green Run inlet; near Assateague lighthouse, and at Cedar inlet.

CHAPTER III.

CHESAPEAKE BAY TO CAPE CANAVERAL.

VARIATION IN 1882.

Entrance to Chesapeake Bay $3^{\circ} 15' W.$ | Cape Canaveral $2^{\circ} 30' E.$
Cape Fear $0^{\circ} 35' W.$

CHESAPEAKE BAY* is the largest inlet on the east coast of the United States. Its entrance, between cape Charles on the north, and cape Henry on the south is 11 miles wide, but the shoals extending southward from cape Charles, limit the breadth of the main passage known as Cape Henry channel, to about $2\frac{1}{2}$ miles for heavy draught vessels. The bay is about 170 miles in length with a general north and south direction; the southern 80 miles varying from 15 to 20, and the remainder, not less than $2\frac{1}{4}$ and in some places, 10 miles in breadth. The eastern waters, near the termination, are separated from Delaware river by a distance of only 10 miles. It receives on its western side the waters of James, York, Rappahannock, Potomac, Patuxent, Patapsco, and Susquehanna, all large and navigable rivers, besides many smaller streams on both sides, draining a surface of about 60,000 square miles. The fairway courses of the bay lead over a depth of not less than 22 feet at mean low water, for 136 miles, or as far northward as the entrance to Patapsco river, 9 miles westward of which, is pleasantly situated on slightly undulating ground, on the north bank of the river, the city of Baltimore.

The latter is of great commercial importance, and carries on a large inland trade; its population in 1880 amounting to 333,190. Vessels not drawing more than 13 feet water, will find ample working room in Patapsco river; those of heavier draught can only proceed to Baltimore with a leading wind or stream, closely keeping the line of the leading lights and buoys, in Brewerton or Craighill channels, with not less than 19 feet at mean low water.

Annapolis roads, situated at the mouth of Severn river, flowing into the west side of Chesapeake bay, 12 miles southward of the entrance to Patapsco river, contain good anchorage for a large vessel in 4 to

* See Admiralty charts:—Chesapeake bay, Nos. 355a, 355b, scale, $m = 0.3$ of an inch; and in 6 sheets, No. 2,843 a to f, scale, $m = 0.9$ of an inch.

8 fathoms. Although, as before stated, the prescribed courses pass over as little as 22 feet water, with local assistance not less than 5 fathoms, could be carried from the entrance, to this roadstead. If proceeding farther northward, it would be advisable for a vessel of heavy draught to take a pilot.

James river, is the southernmost of the above mentioned rivers, flowing into the west side of Chesapeake bay, and 100 miles from its entrance are situated the towns of Richmond and Manchester. Vessels of 15 feet draught can proceed for about 70 miles to the junction of Appomattox river, and those of 7 feet draught to Warwick Bar, within 5 miles of Richmond. The entrance to James river lies between Old point Comfort on the north, and Willoughby point on the south, $14\frac{1}{2}$ miles westward from cape Henry ; and here are situated Hampton roads, one of the most important anchorages in the United States. The least water in the channel leading to this roadstead is 5 fathoms.

Elizabeth river flows into the southern part of Hampton roads. The town of Norfolk containing the naval hospital is situated on the east bank of Elizabeth river, $6\frac{1}{2}$ miles southward from Sewall point its eastern entrance point ; and the suburb of Gosport on the opposite side, one mile farther from the entrance. The latter contains the navy yard, with a graving dock, 281 feet in length, 60 feet broad, having 25 feet water over the sill.

The depth of 21 feet, can be carried to Gosport with the assistance of a pilot.

LIGHTS in entering CHESAPEAKE BAY and HAMPTON ROADS.—Hog island.—This white coloured lighthouse, is erected upon the south-west part of Hog island, on the north side of the entrance to Great Machipongo inlet, Virginia. It exhibits, at the height of 60 feet above high water, a *fixed* white light visible 13 miles.

Cape Charles.—On Smith island, near cape Charles, the north entrance point of Chesapeake bay, is a circular white tower, 150 feet from the base to centre of lantern, which exhibits, at 160 feet above high water, a *flashing* white light, of *three seconds* duration at intervals of *forty-five seconds*, and visible in clear weather from a distance of 19 miles.

Currituck Beach.—On the coast of North Carolina, and nearly midway between cape Henry and Body island lighthouses, is erected a red painted tower, 150 feet in height, which exhibits at an elevation of 158 feet above high water, a *fixed* white light, varied by a *red flash* every *minute and a half*, and visible 18 miles.

Cape Henry.—On cape Henry, the south entrance point of Chesapeake bay, is a black and white tower, 152 feet high, which exhibits, at 160 feet above high water, a *fixed* white light, visible 19 miles. There are high white sand hills in the vicinity, in some places 85 feet above the sea.

Fog signal.—In foggy weather, a siren is sounded, giving blasts of *five seconds* duration, every *minute and a half*.

Thimble Shoal.—On Thimble shoal, situated on the south edge of Horse-shoe, is erected in 11 feet of water, a drab coloured screw pile lighthouse, which exhibits, at an elevation of 45 feet above high water, a *fixed* white light, for the period of *one minute*, followed during the next minute, by *six alternate red and white flashes*, at intervals of *ten seconds*, and visible from a distance of 12 miles.

Fog signal.—In foggy weather and snow storms, *two* bells will be sounded simultaneously, giving *one stroke* at intervals of *five seconds*.

Old point Comfort lighthouse, is situated on the point of that name, the north entrance point to Hampton roads and James river. It is white, and exhibits, at 48 feet above high water, a *fixed* white light, visible 12 miles. From the westward, this light is obscured, when bearing eastward of E. $\frac{1}{2}$ N.

Fog signal.—A bell is sounded during foggy weather, at intervals of *ten seconds*.

Back river.—This white coloured lighthouse is situated 1 $\frac{1}{2}$ miles south eastward from the south entrance point to Back river; exhibiting, at an elevation of 35 feet above high water, a *fixed* white light varied by a *white flash every minute and a half*, visible 11 miles. The flash is preceded and followed by an eclipse of *five seconds*.

Craney island lighthouse, stands in the depth of 3 feet at low water, on the east extreme of Craney island shoal, extending from the west entrance point of Elizabeth river. It is a square white lighthouse, on a screw pile foundation, painted brown, exhibiting at 40 feet above high water, a *fixed* white light, visible 12 miles.

Fog signal.—A bell is sounded during foggy weather, at intervals of *twelve seconds*.

Nansemond River.—In 5 feet water, half a mile northward of Pig point, the eastern entrance point of Nansemond river, is erected a white, hexagonal screw pile structure, which exhibits, at an elevation of 38 feet above high water, a *fixed red* light, visible 11 miles.

Fog signal.—In foggy weather, a bell is sounded every *seven seconds*.

DANGERS in entering CHESAPEAKE bay and HAMPTON ROADS*.—Smith island shoal, with 3 $\frac{1}{4}$ fathoms over it, lies E. $\frac{3}{4}$ S., distant 7 $\frac{1}{2}$ miles from cape Charles lighthouse.

* See Admiralty plan :—Hampton roads and Elizabeth river, No. 2,816; scale, m = 1.8 inches.

Shark shoal, with 17 feet least water on it, is situated S.E. by E. $\frac{3}{4}$ E., $4\frac{1}{2}$ miles distant from the same lighthouse.

An automatic whistling buoy, painted red, with the letters C.C. in white, is moored in 6 fathoms water south-east $6\frac{1}{2}$ miles from cape Charles lighthouse, and S. $\frac{3}{4}$ E. distant $2\frac{1}{2}$ miles from Shark shoal.

Nautilus shoal with 10 to 12 feet water over it, is one mile long east and west, and lies 2 miles south eastward from The Isaacs. Its shoalest part bears S.S.W. $\frac{1}{2}$ W. distant $4\frac{1}{2}$ miles from cape Charles lighthouse.

On the south-east coast of cape Charles, not more than 4 fathoms, will be found between Nautilus shoal, and the north-east extreme of Smith island, at an average distance of 3 miles from the shore.

From Nautilus shoal, the south-west extreme of the trees at cape Charles, is in line with Guy point.

Cape Charles lighthouse well open eastward of the trees, situated southward of it, leads eastward of Nautilus shoal.

Middle ground, almost joined to the latter shoal by shallow water near its east extreme, is $10\frac{1}{2}$ miles long, in a general north-west and south-east direction, with depths over it varying from 11 to 18 feet; the former depth occurring near the centre of the shoal, and bearing N. by W. $\frac{1}{4}$ W. distant $7\frac{3}{4}$ miles from cape Henry lighthouse. One-third of a mile southward from the south-east extreme of Middle ground, is placed a red buoy (No. 2), which bears N.N.E. $\frac{1}{4}$ E., distant $5\frac{3}{4}$ miles from cape Henry lighthouse. Near its north-west extreme is moored a similar buoy (No. 6), bearing E. by N. $\frac{3}{8}$ N., distant $8\frac{1}{2}$ miles from Back river lighthouse, and N. by W. $\frac{3}{4}$ W., $2\frac{1}{2}$ miles from a third red buoy marked No. 4.

A shoal of $3\frac{3}{4}$ fathoms, is situated south-eastward of the east extreme of Middle ground, with its southern part bearing N.E. $\frac{1}{2}$ E., distant 6 miles from cape Henry lighthouse.

A shoal with $3\frac{1}{2}$ fathoms over it, three-quarters of a mile long in a N.N.W. and S.S.E. direction, lies with its south extreme, bearing N.E. $\frac{1}{4}$ N. distant $3\frac{1}{4}$ miles from the same lighthouse.

Three-quarters of a mile southward from this shoal, is placed a red buoy, marked No. 2, bearing N.E. $\frac{1}{2}$ E. distant $2\frac{3}{4}$ miles from the same lighthouse.

Between Middle ground, Nautilus shoal, and cape Charles are several shoal patches, and the extensive shoal, known as Inner Middle ground, separating which from the cape is a passage known as North channel, but which should not be attempted by strangers. Middle ground is steep-to on the western side, suddenly shoaling from 7 and 6 fathoms to 18 and 16 feet water.

Horse-shoe, is a triangularly shaped shoal, extending E.S.E. $5\frac{1}{2}$ miles from the shore between Back river and Old point Comfort, and

separating the main channel of Chesapeake bay, from that leading into Hampton roads. It has depths over it, varying from 9 feet on the western, to 16 feet on the eastern portion. In $3\frac{1}{2}$ fathoms near the eastern extreme, is placed a black buoy marked No. 3, bearing E. $\frac{3}{8}$ S. distant $3\frac{1}{2}$ miles from Thimble shoal lighthouse.

The south side of Horse-shoe is well marked by Thimble shoal lighthouse, erected on the shoal of that name, on which the least water is 10 feet.

A black buoy marked No. 4, is placed on the same side of the shoal in 3 fathoms water, bearing W. $\frac{3}{8}$ N., distant $1\frac{2}{3}$ miles from Thimble shoal lighthouse.

Tail of Horse-shoe, with 17 feet least water over it, is $1\frac{3}{4}$ miles long, within the depth of 3 fathoms, and half a mile broad, being separated from Horse-shoe by the depth of 4 fathoms. Its south-east extreme is marked by a black buoy (No. 1), bearing N.W. $\frac{1}{4}$ W., distant $7\frac{1}{4}$ miles from cape Henry lighthouse.

A patch with $4\frac{1}{4}$ fathoms on it, lies N. $\frac{1}{2}$ E. distant $2\frac{3}{4}$ miles from this buoy.

A buoy, painted red and black in horizontal stripes, is moored in $4\frac{1}{2}$ fathoms, two-thirds of a mile south-eastward from a depth of $3\frac{1}{2}$ fathoms, and bearing N.W. $\frac{3}{4}$ N. distant 4 miles from cape Henry lighthouse.

Willoughby bank, with 6 to 18 feet water over it, is 3 miles long in a N.W. by W. direction, and extends $2\frac{1}{4}$ miles north-east from Willoughby point. The north side is marked by a black buoy, which bears East, $2\frac{6}{10}$ miles from Old point Comfort lighthouse. In addition to the above mentioned buoys, two others, marked with black and white perpendicular stripes, are moored in the fairway leading to Hampton roads, bearing E. $\frac{3}{8}$ S., distant $6\frac{2}{3}$ miles, and E. $\frac{1}{4}$ S. 4 miles, from Old point Comfort lighthouse.

Rip Raps, with 4 feet least water on them, and connected by shoal water with Willoughby bank, extend $1\frac{1}{4}$ miles north-westward from Willoughby point or Sandspit. The northern edge is well marked by Fort Wool erected thereon, and the western [side is marked by a black buoy (No 3), three quarters of a mile northward of Sewall point, and bearing S.S.W. $\frac{3}{4}$ W., $2\frac{1}{2}$ miles from Old point Comfort lighthouse.

Craney island Flats, with 9 to 15 feet water over them extend from 2 to $2\frac{1}{2}$ miles from the south shore of Hampton roads, the northern edge being marked by two buoys, the eastern one red, and bearing N. $\frac{1}{4}$ E. distant $3\frac{1}{2}$ miles from Craney island lighthouse, the other black and white perpendicularly striped, bearing N.W. $\frac{3}{4}$ W. $3\frac{3}{4}$ miles from the same.

Hampton Bar, is the name given to the north-east and shoalest portion of the bank between Newport News point, and Old point Comfort.

It has only 2 feet water upon it and each extreme is marked by a red buoy, bearing respectively W. by S. $\frac{3}{4}$ S., 3 cables, and S.W. by W. $\frac{3}{4}$ W. $2\frac{1}{2}$ miles, from Old point Comfort lighthouse.

Newport News Middle ground, is a shoal with 17 feet least water on it, lying in the middle of the channel, on the western side of Hampton roads. It is a mile long, in an east and west direction, each extreme being marked by a red and black horizontally striped buoy, bearing S.E. by E. $\frac{1}{4}$ E., distant 2 miles, and S.S.E. $\frac{1}{2}$ E., $1\frac{2}{10}$ miles, from Newport News point.

A patch of 17 feet, lies between this last mentioned shoal, and the shoal water from Newport News point, and is marked by a red and black horizontally striped buoy, bearing S.E. by E. $\frac{1}{2}$ E. distant nearly a mile from the same point.

DIRECTIONS for entering CHESAPEAKE BAY and HAMPTON ROADS.—Approaching the entrance to Chesapeake bay from the north-eastward; with Winter Quarter light vessel bearing N.W. by W. distant 5 miles, steer S.W. $\frac{3}{4}$ S. for $62\frac{1}{2}$ miles, until cape Henry lighthouse bears W.S.W. distant $15\frac{1}{2}$ miles, cape Charles lighthouse N.W. by W. 10 miles, and the automatic buoy, southward of Shark shoal, bears W. by N. $\frac{3}{8}$ N. distant 4 miles. This course passes 6, and 3 miles south-eastward respectively, of Paramore bank, and Smith island shoal, with 14 to 11 fathoms north-eastward of Hog island lighthouse, and 10 to 7 fathoms south-westward of the same.

Steer now for cape Henry lighthouse, until it is distant $2\frac{3}{4}$ miles, and No. 2 red buoy, moored southward of the shoal of $3\frac{1}{2}$ fathoms on the north side of the channel, bears N.W. $\frac{3}{4}$ N. distant three quarters of a mile. Proceed from this position, W. by N. $\frac{1}{2}$ N. for the two black and white vertically striped fairway buoys; passing three-quarters of a mile southward of the south-easternmost buoy of Tail of Horse-shoe, and making due allowance for the set of the flood or ebb stream.

After passing 2 cables northward of Willoughby bank buoy, and Thimble shoal lighthouse bears N.E. by E. $\frac{1}{2}$ E., steer W. $\frac{1}{3}$ S. for Old point Comfort lighthouse, until the east extreme of fort Wool erected on Rip Raps, is in line with Sewall point, bearing S.W. by S. Steer now S.W. by W $\frac{1}{4}$ W., midway between fort Wool, and Old point Comfort lighthouse, and anchor in Hampton roads, in 7 to 10 fathoms, with the latter lighthouse bearing from N.E. $\frac{1}{2}$ N. to N.E. $\frac{1}{2}$ E., distant from one to 3 miles. If mooring, have open hawse to northward and eastward. The least water passed over on the above courses, is 5 fathoms.

If working to windward, to avoid the south side of the eastern part of Horse-shoe, Thimble shoal-lighthouse, should be kept bearing north of

W. by N., and to pass north of Willoughby bank, Old point Comfort lighthouse should not be brought to bear northward of W. $\frac{1}{4}$ N.

Approaching the entrance from the southward.—With Currituck beach lighthouse bearing West, distant 8 miles, steer N. by W. $\frac{1}{2}$ W. 34 miles, with 11 to 7 fathoms water, until cape Henry lighthouse bears W. $\frac{3}{4}$ N. distant 8 miles cape Charles lighthouse, N. $\frac{3}{4}$ W. 12 $\frac{1}{2}$ miles, and Willoughby point trees are open northward of cape Henry bearing W. $\frac{5}{8}$ N. From this position, steer W. by N. $\frac{1}{2}$ N., until cape Henry lighthouse bears W.S.W. distant 2 $\frac{3}{4}$ miles and No. 2 buoy bears N.W. $\frac{3}{4}$ N. distant three-quarters of a mile, whence proceed as before directed.

At about 12 miles southward of cape Henry is the north end of a lake named Back bay, divided from the ocean by a sandy beach, the southern extremity of which is dotted with high sand dunes and wooded hummocks, known as Wash woods. Further north are Wash flats, so near the general level of the sea, as to be submerged during strong easterly gales. When viewed from a vessel at sea, it appears a continuation of the ocean, and, with the high sand hill range, and trees of the Wash woods, presents so near a resemblance to the entrance of Chesapeake bay at cape Henry as to have often been taken for it, with disastrous effects.

False cape is situated about 20 miles southward of cape Henry. The shore between them, somewhat resembles that of Lynn Haven road, and in thick weather if the lighthouse on cape Henry cannot be seen, a stranger may mistake it for Lynn Haven road.

A shoal with 15 feet water over it lies E.N.E. from False cape distant 1 $\frac{1}{4}$ miles with 7 fathoms immediately outside.

The woods of Smith island, appear broken and uneven, from a distance seaward, when bearing from W. $\frac{1}{2}$ N. to W. $\frac{1}{2}$ S.; with other bearings they appear even and solid.

On account of the generally small elevation of the land in the vicinity of the entrance to Chesapeake bay, the absence of recognisable objects, the distance of the dangers from the shore north-eastward of the entrance, the delusive appearance of the southern shore, the proximity of the deep water to the shoals off False cape, and the south-westerly set of the current near the shore between capes Henry and Hatteras, great caution is necessary in making Chesapeake day; the lead should be continuously hove, even in fine weather, and when thick, vessels should not shoal to less than 15 fathoms between Winter Quarter light vessel, and Currituck lighthouse.

ANCHORAGES.—Lynn Haven road is situated westward of cape Henry, and should circumstances require it, affords good anchorage in 7 to 4 fathoms, under the steep north-west shore of that cape.

Vessels may anchor near Tail of Horse-shoe in 5 fathoms water, fine sand, at about 5 miles north-westward of cape Henry lighthouse.

LIGHTS in CHESAPEAKE BAY, between HAMPTON ROADS and BALTIMORE.—**York Spit.**—This yellow, hexagonal, screw pile structure stands in 12 feet water, near the south-east extreme of York Spit situated between the entrances to York river and Mobjack bay. It exhibits a *fixed red* light, elevated 38 feet above high water, and visible 11 miles.

Fog signal.—In foggy weather a bell is sounded every *ten seconds*.

New point Comfort lighthouse, is erected upon the south extreme of that point, the north-east entrance point of Mobjack bay. The white tower exhibits, at an elevation above high water of 60 feet, a *fixed* white light, visible 13 miles seaward, between the bearings of S.W. by S., and S.E. by E.

Cherrystone lighthouse, situated on a shoal, on the west side of entrance to Cherrystone inlet, on the east side of the bay, is a white hexagonal screw pile structure standing in 5 feet of water, and exhibits, from an elevation of 36 feet above high water, a *fixed* white light, visible 11 miles.

Fog signal.—In foggy weather, a bell is sounded, giving *two strokes* in quick succession at intervals of *thirty seconds*.

Wolf Trap lighthouse stands in 12 feet water, on the east side of Wolf Trap spit, and bears N.E. $\frac{1}{2}$ N. distant $6\frac{3}{4}$ miles from New point Comfort lighthouse. It is an hexagonal structure on screw piles, painted lead colour, exhibiting, at a height of 38 feet above high water, a *fixed* white light varied by a *white flash* every *thirty seconds*, visible 11 miles.

Fog signal.—In foggy weather a bell is sounded at intervals of *fifteen seconds*.

Stingray Point.—About one mile eastward of this point, the south entrance point of Rappahannock river, and standing in 6 feet of water, is erected a white hexagonal lighthouse on screw piles, which exhibits, at an elevation of 36 feet above high water, a *fixed red* light, visible 11 miles.

Fog signal.—In foggy weather, a bell is sounded at alternate intervals of *five*, and *thirty seconds*.

Windmill Point lighthouse is erected on the central part of Rappahannock spit, and about 2 miles south-eastward from Windmill point, the north entrance point of Rappahannock river. It is a straw-coloured, hexagonal screw pile structure, standing in 12 feet water, and exhibits, from a height of 38 feet above high water, a *fixed* white light, visible 11 miles.

Fog signal.—In foggy weather a bell is sounded at intervals of *ten seconds*.

Smith Point lighthouse, on the east side of the shoal extending from that point, the south-east entrance point of Potomac river, is a white, hexagonally shaped structure, standing in 12 feet water, exhibiting, from an elevation of 38 feet above high water, a *flashing* white light showing a *white flash* every *thirty seconds* visible 11 miles.

Fog signal.—In foggy weather, a bell is sounded every *fifteen seconds*.

Point Look-out lighthouse, is situated on the point of that name, the north-west entrance point of Potomac river. The *fixed* white light, elevated 43 feet above high water, is exhibited from a tower on the keeper's white dwelling, and visible 11 miles. In Potomac river, the light is obscured when bearing south of S.E. by E.

Fog signal.—In foggy weather a bell is sounded every *ten seconds*.

Watts Island.—This lighthouse is erected on Little Watts island on the east side of Tangier sound. It is a white detached tower, which exhibits at 40 feet above the ground, and 50 feet above high water, a *fixed* white light, varied by a *white flash* every *two minutes*, and visible 12 miles.

Solomon's Lump lighthouse is situated in Kedges strait, on the east side of Chesapeake bay. It is a white, square building, standing on piles in 6 feet of water, and at an elevation of 42 feet above high water, exhibits a *fixed* white light, visible 11 miles. From the westward, this light is obscured when bearing northward of E.N.E.

Fog signal.—In foggy weather a bell is sounded, giving *two strokes* in quick succession, alternately with a *single stroke* at intervals of *thirty seconds*.

Cove Point.—On the point of this name, situated 4 miles north-eastward from the entrance to Patuxent river, is erected a white lighthouse, which exhibits, from an elevation of 46 feet above high water, a *fixed* white light, varied by a *white flash* every *minute and a half*.

Fog signal.—In foggy weather, a bell is sounded every *twelve seconds*.

Hoopers Strait.—On the north side of the channel of this name, connecting the main channel of Chesapeake bay with Tangier sound, stands in 6 feet water, a white hexagonal screw pile structure, exhibiting, from an elevation of 42 feet above high water, a *fixed* white light with rays of *red* light, visible 11 miles.

The southern limits of the rays of *red* light intersect each other at Bishop's Head buoy. Vessels entering Hooper strait from Chesapeake bay, should keep in Hooper strait *white* light until they have crossed the *red* ray of Clay island lighthouse, thence keeping in Clay island *white* light till the *red* ray of Hooper strait lighthouse is passed. Shark Fin shoal can then be crossed in 9 feet water.

Fog signal.—In foggy weather a bell is sounded every *twelve seconds*.

Sharp Island.—This lighthouse is erected near the north extreme of Sharp island, in the entrance to Choptank river, on the east side of Chesapeake bay. The light is a *fixed* white light, elevated 53 feet above high water and visible 13 miles.

Bloody Point Bar lighthouse stands in 8 feet at low water, on the northern side of entrance to Eastern bay, St. Michael's river. The tower is white, lantern red, and exhibits at an elevation of 56 feet above high water, a *fixed red* light, visible 13 miles.

Thomas point shoal.—On the east extreme of this shoal, extending from the point of that name, the north-east entrance point to South river, on the west side of the bay, is erected a white hexagonally shaped, screw pile lighthouse. It stands in 8 feet of water and exhibits, at an elevation of 43 feet above high water, a *flashing red* light every *thirty seconds*, visible 12 miles.

Fog signal.—In foggy weather a bell is sounded, giving *three strokes* in quick succession every *thirty seconds*.

Greenbury Point lighthouse is erected on that point, the north entrance point of Severn river. The red lantern is attached to the keeper's white dwelling, and, from an elevation of 50 feet above high water, exhibits a *fixed white* light, visible 11 miles.

Sandy Point.—This lighthouse is situated on the point of this name, on the west side of Chesapeake bay, and $2\frac{3}{4}$ miles south-eastward from the entrance to Magothy river. The red lantern is attached to the keeper's dwelling of the same colour, and from a height of 50 feet above high water exhibits a *fixed white* light, varied by a *white flash* every *minute and a half*, visible 12 miles.

Fog signal.—In foggy weather, a bell is sounded at intervals of *ten seconds*.

Love Point.—On the shoal extending north-eastward from Love point, the north extreme of Kent island, and about one mile distant from that point, stands a white hexagonal screw pile lighthouse, exhibiting from an elevation of 38 feet above high water, a *fixed white* light, visible 11 miles.

Fog signal.—In foggy weather, a bell is sounded at intervals of *eight seconds*.

Seven-foot Knoll.—This lighthouse is erected upon the shoal of that name, in the entrance to Patapsco river, and one mile south-westward of the junction of Craighill and Brewerton channels. It is painted black, and exhibits, from a height of 43 feet above high water, a *fixed red* light visible 12 miles.

Fog signal.—In foggy weather, a bell is sounded every *twelve seconds*.

Craighill channel (rear).—This lighthouse is erected near the south-west extreme of Hart island, and about 3 miles north-eastward from North point, the north entrance point of Patapsco river. It is in the shape of a pyramid, the lower portion being straw colour, and the upper part brown, and exhibits, at an elevation of 106 feet above high water, a *fixed white* light, visible 16 miles when in, and nearly in line with the next mentioned lighthouse.

Craighill channel (front).—At $2\frac{1}{4}$ miles E. $\frac{1}{8}$ S. from North point, and S. $\frac{1}{8}$ W. the same distance from Craighill channel (rear) lighthouse, is erected in the depth of 15 feet water, a white dwelling sup-

ported on a brown cylindrical foundation. A red lantern elevated 39 feet above high water, surmounts the structure, and exhibits a *fixed* white light visible 11 miles. Underneath this light, and elevated 22 feet above high water, is exhibited another *fixed* white light visible 10 miles when in line with Craighill channel (rear) lighthouse. Craighill channel lights in line, bearing N. $\frac{1}{2}$ E., leads through Craighill channel, to its junction with Brewerton channel.

Fog signal.—In foggy weather a bell is sounded at alternate intervals of *three, and thirty seconds.*

Hawkins point.—This lighthouse is situated near the point of that name, on the south-west side of Patapsco river. It is a white, hexagonal, screw pile structure, exhibiting, at an elevation of 28 feet above high water, a *fixed* white light visible 10 miles when in, and nearly in line with the next mentioned light.

Leading point lighthouse stands upon this point, bearing N.W. by W. $\frac{1}{2}$ W., distant one mile from Hawkins point light. The white tower is attached to the brown dwelling, and exhibits, at an elevation of 70 feet above high water, a *fixed* white light, visible 14 miles when in, and nearly in line with Hawkins point lighthouse. These two lighthouses kept *exactly* in line, lead through Brewerton channel.

Fort Carroll lighthouse is attached to the south-west portion of the fort of that name, situated about two-thirds of a mile north eastward from Hawkins point. It exhibits, from the height of 75 feet above high water, a *fixed* white light, visible 13 miles.

Fog signal.—In foggy weather, a bell is sounded every *ten seconds.*

Lazaretto point.—This lighthouse stands upon the point of this name, the east entrance point of Baltimore harbour. It exhibits, from a white tower, a *fixed red* light, elevated 35 feet above high water, and visible 11 miles. From the harbour, this light is not visible, when bearing south of S. by E. $\frac{1}{2}$ E.

Poole island lighthouse, is erected upon the island of that name, situated 9 miles north-eastward of the entrance to Patapsco river. It is coloured white, and exhibits, at an elevation of 35 feet above high water, a *fixed* white light visible 11 miles.

Fog signal.—In foggy weather, a bell is sounded every *twelve seconds.*

DANGERS and buoys, between MIDDLE GROUND and BALTIMORE.—**East side of main channel.**—Old **Plantation Flats**, extend $1\frac{2}{3}$ miles westward from Cherrystone lighthouse, with depths under 18 feet, and are marked by a red buoy (No. 8), bearing W. $\frac{1}{2}$ S., distant $1\frac{1}{10}$ miles from that lighthouse.

No. 10 red buoy, marks the west extreme of a large bank, having from 11 to 15 feet water over it, extending W. by S. $\frac{1}{2}$ S., $4\frac{1}{3}$ miles from the southern part of Tangier island. The buoy is placed near the depth of $6\frac{1}{4}$ fathoms, and bears S.E. by S. distant $8\frac{1}{10}$ miles from Smith point lighthouse.

A shoal with $3\frac{3}{4}$ fathoms over it, lies in the fairway, bearing W.S.W., distant 3 miles from No. 10 buoy, and a depth of $4\frac{1}{2}$ fathoms is situated W. by N. $3\frac{1}{4}$ miles from the same. Depths varying from $4\frac{1}{2}$ to $5\frac{1}{4}$ fathoms, will be found between these patches, and No. 10 buoy.

No. 12 red buoy, marks the south-west extreme of a bank, situated westward of Kedges strait, 6 miles long in a N.W. by N. direction, having 13 feet least water over it. The buoy is placed in 4 fathoms, and bears N. by E. $\frac{3}{8}$ E., distant nearly 6 miles from Smith point lighthouse.

No. 14 red buoy, marks the north-west extreme of the same shoal, bearing E. by N. $\frac{4}{5}$ N., distant $6\frac{1}{4}$ miles from point Lookout lighthouse.

Shoal water, under the depth of 3 fathoms, extends 3 miles south-westward from the middle portion of Hooper island, and from one to $1\frac{3}{4}$ miles from the shore, between Barren island and James point, the southern entrance point of Hudson river. Working to windward, strangers should be cautious in approaching the east side of the bay, in this locality, as the deepest water is found close to the western edge of the shoals. The opposite shore is much bolder, and the decrease in the depth in the approach thereto, much more gradual.

No. 16 red buoy, marks the west side of the shoal, with 9 feet least water on it, extending $1\frac{1}{4}$ miles south-westward from Sharp island. The buoy bears S.W. $\frac{1}{2}$ W., distant $2\frac{1}{4}$ miles from the north-west extreme of Sharp island.

No. 18 red buoy, is placed on the west side of the shoal water, extending $1\frac{2}{10}$ westward from Poplar island, and bears S.S.W. $\frac{3}{4}$ W. distant 5 miles from the south extreme of Kent point. The buoy lies $1\frac{1}{2}$ cables south-westward of the depth of 9 feet.

No. 20 red buoy, marks the south-west extreme of the shoal with 6 feet water over it, extending south-westward from Kent point, the south extreme of Kent island. The buoy bears W. by S. $\frac{1}{2}$ S., distant one mile from that point.

No. 22 red buoy, bearing E.S.E., distant $4\frac{1}{2}$ miles from Seven-foot knoll lighthouse, marks the western edge of the shoal with from 8 to 13 feet water over it, extending south-west nearly 2 miles from Swan point.

No. 2 red buoy is placed in 4 fathoms, a short distance northward of the line of Brewerton channel lights in one, and N.W. $\frac{1}{2}$ N. $1\frac{6}{10}$ miles from No. 22 buoy.

A succession of red buoys at short intervals, mark the north-east bank of the channel, hence to the entrance to Baltimore harbour.

West side of main channel.—**York spit**, well marked by its lighthouse, has from 5 to 18 feet over it, and extends south-eastward, 6 miles from the ragged point separating, York river and Mobjack bay. Its south-east extreme, is marked by a black buoy (No. 1), bearing S. by E. $\frac{1}{2}$ E., distant three-quarters of a mile from York spit lighthouse.

A patch of 21 feet lies E. by S. $\frac{1}{2}$ S., distant $3\frac{1}{2}$ miles from the same lighthouse.*

New Point shoal, with 16 feet least water, is $1\frac{1}{4}$ miles long E.N.E. and W.S.W., between the depths of 3 fathoms. Its north-east extreme, is marked with a black buoy (No. 3), bearing S.E. $\frac{3}{4}$ E., distant $4\frac{2}{10}$ miles from New point Comfort lighthouse.

Wolf Trap spit, with 10 to 15 feet water over its eastern portion, has its eastern extreme marked by a black buoy (No. 7), bearing E. $\frac{1}{2}$ N., distant half a mile from Wolf Trap lighthouse.

A shoal lies with its shallowest part on which there is a depth of $4\frac{1}{2}$ fathoms, bearing N.E. by E. $\frac{1}{4}$ E., distant $2\frac{1}{4}$ miles from the same lighthouse. The fairway course passes over the shoal.

Rappahannock spit, extends E.S.E. $4\frac{1}{10}$ miles, from Windmill point. On the shoal between the lighthouse erected thereon and Windmill point, there is from 6 to 8 feet water, and between the lighthouse and No. 9 black buoy, marking its south-east extreme, the depth varies from 13 to 18 feet. No. 9 buoy bears S.E. by E. $\frac{5}{8}$ E., distant $2\frac{2}{10}$ miles from Windmill point lighthouse.

No. 11, black buoy marks the south-east side of the shoal water, extending eastward 2 miles from Smith point, where is situated the lighthouse of that name. The buoy bears S. by E. $\frac{1}{2}$ E. $1\frac{1}{10}$ miles from the lighthouse. A black buoy marked No. 1, is placed in 3 fathoms, N.N.W. $\frac{1}{2}$ W., half a mile from the same lighthouse.

Shoal water under the depth of 18 feet, extends seven-eighths of a mile eastward from the shore near point No Point, situated $5\frac{1}{2}$ miles north-

* Staff Commander Dathan, R.N., remarks that both on the passage up, and down Chesapeake bay, in H.M.S. *Royal Alfred* in 1872, there was no indication of this patch, and that the pilots assert it does not exist.

ward of Point Look-out. A black buoy un-numbered, is placed in $3\frac{1}{2}$ fathoms near its eastern edge.

No. 13 black buoy is placed near the eastern edge of a shoal, with 9 to 11 feet water on it, extending $1\frac{2}{5}$ miles eastward from Holland point, the south entrance point of Herring bay. This buoy bears N.W. $\frac{1}{4}$ N. distant 8 miles from Sharp island lighthouse.

No. 15 black buoy marks the east side of the shoal extending eastward, $1\frac{1}{5}$ miles, from Horse-shoe point. The buoy is moored near the depth of 14 feet, and bears S.S.W., distant 4 miles from Thomas point shoal lighthouse.

Thomas point shoal, the eastern extreme of which is conspicuously marked by its lighthouse, has from 6 to 7 feet water between the latter, and Thomas point. No. 17 black buoy is placed S. $\frac{1}{2}$ E., distant 3 cables from the same lighthouse.

No. 19 black buoy is moored on the eastern extremity of the shoal, on the south side of Annapolis roads, extending S.E. by E. $\frac{1}{2}$ E. one mile from Tally point. The buoy bears N. $\frac{5}{8}$ E., distant $1\frac{8}{5}$ miles from Thomas point shoal lighthouse, and S.S.E. $\frac{1}{2}$ E., $2\frac{6}{10}$ miles from the lighthouse on Greenbury point. Between the buoy and Tally point, there is as little as 6 feet water.

North shoal, is the name given to the shallow water, extending one mile southward from Hackett point, on the north side of Annapolis roads. It has 8 feet on the northern, and 15 to 17 feet on the southern portion; the east edge of the latter, being marked by a black buoy (No. 21), bearing N. by E. $\frac{1}{2}$ E., distant $4\frac{1}{10}$ miles from Thomas point shoal lighthouse, and E. $\frac{3}{4}$ S., 2 miles from Greenbury lighthouse.

No. 23 black buoy marks the eastern side of the shoal water, extending with a depth of under three fathoms, eastward from Sandy point, on which is situated the lighthouse of that name. The buoy bears from the latter S.E. by E. $\frac{1}{4}$ E., distant 7 cables.

No. 25, black buoy in 3 fathoms, marks the eastern edge of the shoal water, under that depth, extending $1\frac{1}{2}$ miles eastward from the entrance to Magothy river. The buoy bears N. by W. distant $1\frac{8}{10}$ miles from Sandy point lighthouse.

A red buoy (No. 2), placed just on the east side of the fairway course, leading to the south entrance of Craighill channel, bears N. $\frac{1}{2}$ E., distant $3\frac{1}{2}$ miles from the same lighthouse, and half a mile southward from the next mentioned buoys.

Two buoys, the eastern one red (No. 4), and the other black (No. 1) distant from each other about three-quarters of a cable, mark the southern

entrance to Craighill channel. The line of the leading lights for that channel in one, passes between them. A succession of red buoys placed at short intervals, mark the eastern edge of that artificial channel, to its junction with Brewerton channel.

No. 27 black buoy is moored on the southern part of Belvidere shoal with 8 feet water. It bears S.S.E., distant $3\frac{3}{4}$ miles from Seven foot knoll lighthouse. Depths less than 18 feet, will be found for one mile south, and south-east from this buoy, and for $1\frac{3}{4}$ miles in a north-east direction; all vessels but those of the lightest draught, should keep the line of the two fairway buoys hereafter mentioned.

Nine-foot knoll with 8 feet water over it, is marked by a black buoy (No. 1), bearing E. by S. $\frac{3}{4}$ S., distant $2\frac{1}{3}$ miles from Seven foot knoll lighthouse, and W. by S. $\frac{1}{2}$ S. $1\frac{1}{10}$ miles from Brewerton channel entrance red buoy (No. 2).

Lower five-fathom buoy, is the name given to the southern fairway buoy, pointed black and white in vertical stripes, placed in $4\frac{1}{2}$ fathoms, and bearing S.E. $\frac{3}{4}$ S. distant $5\frac{2}{3}$ miles from Seven foot knoll lighthouse.

Upper five-fathom buoy, similarly coloured and in the same depth of water, is moored in the fairway, bearing S.E. by E., distant $4\frac{1}{2}$ miles from the same lighthouse, N. by E. $\frac{1}{8}$ E. $2\frac{1}{10}$ miles from Lower five-fathom buoy, and S. by E. $\frac{1}{8}$ E., the latter distance from No. 2 buoy, at the entrance to Brewerton channel.

Directions from cape Henry to Baltimore.—When on the W. by N. $\frac{1}{2}$ N. course for Hampton roads, and cape Henry lighthouse bears S. $\frac{1}{2}$ E., distant $1\frac{3}{4}$ miles, steer N.W. by N. for 12 miles, which if made good will lead to a position, bearing E. by N. $\frac{1}{2}$ N. distant 6 miles from Back river lighthouse, and S.E. $\frac{1}{2}$ S. 7 miles from York spit lighthouse. This course passes nearly half a mile north-eastward of the horizontally striped buoy, placed in $4\frac{1}{2}$ fathoms, $3\frac{1}{4}$ miles south-east of Tail of the Horse-shoe. If working between Middle ground and Horse-shoe, it is useful to remember, that the soundings decrease suddenly in approaching the former, and gradually near the latter.

From the position above mentioned, steer N. $\frac{1}{4}$ E. for 46 miles, or until Smith point lighthouse bears W. $\frac{1}{4}$ N. distant 2 miles. This course passes a little over 2 miles westward of No. 6 buoy, on north-west extreme of Middle ground, and $1\frac{2}{3}$ miles eastward of the 21 feet patch, lying eastward of York spit. It also leads over the shoal of $4\frac{1}{4}$ fathoms, situated north-eastward of Wolf Trap lighthouse; passes 2 miles eastward of No. 9 buoy of Rappahannock spit; over the $3\frac{3}{4}$ fathom patch, south-westward from

Tangier island, and $1\frac{3}{4}$ miles eastward of No. 11 buoy of Smith point shoal.

Working to windward over this portion of Chesapeake bay, the eastern side should be approached with caution, owing to the irregularity of the soundings.

From the position eastward of Smith point lighthouse, steer N. by W. $\frac{3}{4}$ W. for $9\frac{1}{2}$ miles, passing $1\frac{3}{4}$ miles westward of No. 12 buoy, until Point Look-out lighthouse bears W. $\frac{1}{4}$ N., distant 4 miles. The course is now N. by W. for 21 miles, until Cove point lighthouse bears W. $\frac{1}{2}$ N., distant $1\frac{1}{2}$ miles; this course passes $2\frac{1}{4}$ miles westward of No. 14 buoy, and $1\frac{1}{2}$ miles eastward of point No Point shoal buoy. In working, in this part of the bay, heavy draught vessels, in standing to the eastward, should not deepen the water to more than 9 fathoms.

From the position eastward of Cove point lighthouse, steer N. by W. $\frac{1}{2}$ W. $15\frac{1}{4}$ miles, until Sharp island lighthouse bears E. $\frac{3}{4}$ N., distant nearly 4 miles; passing $1\frac{3}{4}$ miles westward of No. 16 buoy of Sharp island shoal. Now alter course to N. $\frac{1}{4}$ E., which keep for $8\frac{1}{2}$ miles, or until the north extreme of Poplar island bears E. $\frac{3}{8}$ N., distant $4\frac{1}{4}$ miles, passing $1\frac{3}{4}$ miles eastward of No. 13, and 2 miles westward of No. 18 buoy. From this position, a N. by E. $\frac{3}{4}$ E. course for $19\frac{1}{2}$ miles will lead to Lower five-fathom fairway buoy, passing about one mile eastward of No. 15, three-quarters of a mile on the same side of No. 17, and two-thirds of a mile eastward of No. 23 black buoy.

As the water shoals suddenly on the east side of the bay, between Sharp island and Love point lighthouses, vessels working to windward should follow the directions previously given, and not deepen the water to more than 9 or 10 fathoms, when standing towards the east shore. Pass close westward of Lower five-fathom buoy, and steer N. by E. $\frac{1}{2}$ E. for Upper five-fathom buoy. Pass one cable eastward and 2 cables north-eastward of the latter, and steer N.N.W. for No. 2 red buoy at the entrance to Brewerton channel. Proceed now for Hawkins and Leading point lights in line, bearing W.N.W. through Brewerton channel, as far as the turning point black buoy No. 9, which bears S. by E. $\frac{1}{2}$ E., distant three-quarters of a mile from fort Carroll lighthouse, the latter open a little north-east of Lazaretto point lighthouse, whence steer for fort McHenry, on the west entrance point to Baltimore, passing close south-westward of the line of red buoys, to the entrance to Baltimore harbour, and thence between the red and black buoys into the harbour.

If wishing to enter Patapsco river by Craighill channel, when on the N. by E. $\frac{3}{4}$ E. course, and Sandy point lighthouse bears N.W., distant nearly $1\frac{1}{2}$ miles, steer N. $\frac{7}{8}$ W. for No. 2 red buoy, at the entrance to Craighill channel, or until the leading lights for that channel are in line bearing N. $\frac{1}{4}$ E. Pass between Nos. 1 and 4 buoys, and steer for these

entrance to Craigbill channel. The line of the leading lights for that channel in one, passes between them. A succession of red buoys placed at short intervals, mark the eastern edge of that artificial channel, to its junction with Brewerton channel.

No. 27 black buoy is moored on the southern part of Belvidere shoal with 8 feet water. It bears S.S.E., distant $3\frac{1}{2}$ miles from Seven foot knoll lighthouse. Depths less than 18 feet, will be found for one mile south, and south-east from this buoy, and for $1\frac{1}{2}$ miles in a north-east direction; all vessels but those of the lightest draught, should keep the line of the two fairway buoys hereafter mentioned.

Nine-foot knoll with 8 feet water over it, is marked by a black buoy (No. 1), bearing E. by S. $\frac{3}{4}$ S., distant $2\frac{1}{3}$ miles from Seven foot knoll lighthouse, and W. by S. $\frac{1}{2}$ S. $1\frac{1}{10}$ miles from Brewerton channel entrance red buoy (No. 2).

Lower five-fathom buoy, is the name given to the southern fairway buoy, pointed black and white in vertical stripes, placed in $4\frac{1}{2}$ fathoms, and bearing S.E. $\frac{1}{2}$ S. distant $5\frac{1}{2}$ miles from Seven foot knoll lighthouse.

Upper five-fathom buoy, similarly coloured and in the same depth of water, is moored in the fairway, bearing S.E. by E., distant $4\frac{1}{2}$ miles from the same lighthouse, N. by E. $\frac{1}{2}$ E. $2\frac{1}{10}$ miles from Lower five-fathom buoy, and S. by E. $\frac{1}{8}$ E., the latter distance from No. 2 buoy, at the entrance to Brewerton channel.

Directions from cape Henry to Baltimore.—When on the W. by N. $\frac{1}{2}$ N. course for Hampton roads, and cape Henry lighthouse bears S. $\frac{1}{2}$ E., distant $1\frac{1}{2}$ miles, steer N.W. by N. for 12 miles, which if made good will lead to a position, bearing E. by N. $\frac{1}{2}$ N. distant 6 miles from Back river lighthouse, and S.E. $\frac{1}{2}$ S. 7 miles from York spit lighthouse. This course passes nearly half a mile north-eastward of the horizontally striped buoy, placed in $4\frac{1}{2}$ fathoms, $3\frac{1}{2}$ miles south-east of Tail of the Horse-shoe. If working between Middle ground and Horse-shoe, it is useful to remember, that the soundings decrease suddenly in approaching the former, and gradually near the latter.

From the position above mentioned, steer N. $\frac{1}{4}$ E. for 46 miles, or until Smith point lighthouse bears W. $\frac{1}{4}$ N. distant 2 miles. This course passes a little over 2 miles westward of No. 6 buoy, on north-west extreme of Middle ground, and $1\frac{1}{2}$ miles eastward of the 21 feet patch, lying east of York spit. It also leads over the shoal of $4\frac{1}{2}$ fathoms, situated eastward of Wolf Trap lighthouse; passes 2 miles eastward of Rappahannock spit; over the $3\frac{1}{2}$ fathom patch, south-

Tanger Island and $\frac{1}{2}$ miles eastward of No. 11 buoy of Smith point shoal.

Working westward over this portion of Chesapeake bay the eastern side should be approached with caution owing to the irregularity of the shoal edge.

From the position eastward of Smith point lighthouse, bear S. by E. $\frac{1}{2}$ miles for $\frac{1}{2}$ miles passing $\frac{1}{2}$ miles westward of No. 11 buoy and Point Lookout lighthouse bears W. $\frac{1}{2}$ S. East $\frac{1}{2}$ miles. The course is now S. by E. for $\frac{1}{2}$ miles and Cove point lighthouse bears W. $\frac{1}{2}$ S. distance $\frac{1}{2}$ miles; this course passes $\frac{1}{2}$ miles westward of No. 14 buoy and $\frac{1}{2}$ miles eastward of point No. 9 Point shoal buoy. In working in this part of the bay heavy freight vessels in sailing to the eastward should not bring the vessel in more than 3 fathoms.

From the position eastward of Cove point lighthouse bear S. of V. $\frac{1}{2}$ W. $\frac{1}{2}$ miles and Sharp point lighthouse bears E. $\frac{1}{2}$ S. distance $\frac{1}{2}$ miles, passing $\frac{1}{2}$ miles eastward of No. 16 buoy of Smith point buoy. Now after course to S. $\frac{1}{2}$ E. which bears N. $\frac{1}{2}$ W. and is westward of Plover Island bears E. $\frac{1}{2}$ N. distance $\frac{1}{2}$ miles, distance $\frac{1}{2}$ miles eastward of S. 14 and 2 miles westward of S. 15 buoys. Bear S. N.W. $\frac{1}{2}$ E. course for $\frac{1}{2}$ miles to the point of Cove point as far west as passing within one mile eastward of S. 16 buoy and $\frac{1}{2}$ mile on the same side of S. 17 and $\frac{1}{2}$ mile to a point west of No. 15 buoy buoy.

As the vessel in this position is in the east end of the western shoal and lower part of the bay there should be a wide turn to the westward, the directions presented above will be followed for a distance of 10 fathoms, when turning toward the east end of the lower part of the bay of Lower Chesapeake Bay and bear S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the point of Cove point buoy. Pass north of $\frac{1}{2}$ miles to the point of Cove point buoy and bear S. $\frac{1}{2}$ E. for $\frac{1}{2}$ miles to the eastern point of Cove point buoy. Proceed now for Burrowes and Lomax buoys and S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to W.W.W. through Covington channel S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the point of Cove point buoy No. 9, which may be S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the westward of the point of Cove point buoy, bearing S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the point of Cove point lighthouse, where the S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the point of Cove point to Burrowes buoy S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the westward to the extreme of Burrowes buoy S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the point of Cove point buoy and S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the westward.

From the last point of the course the vessel should bear S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the point of Cove point buoy S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the point of Cove point lighthouse, where the S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the point of Cove point to Burrowes buoy S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the westward to the extreme of Burrowes buoy S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the point of Cove point buoy and S. $\frac{1}{2}$ E. $\frac{1}{2}$ miles to the westward.

lights in line, until up with the turning point black buoy (No. 9). Round east of this buoy, and steer for Brewerton channel lights in one as before directed.

Wishing to anchor in Annapolis roads, when on the N. by E. $\frac{1}{4}$ E. course and Tally point bears N.W. $\frac{3}{4}$ W., distant $2\frac{1}{2}$ miles, steer N.W. $\frac{1}{2}$ N., passing a quarter of a mile north-eastward No. 19 buoy, and anchoring in $3\frac{1}{2}$ fathoms, with Tally point bearing S.S.W. $\frac{1}{4}$ W.

The best anchorage for heavy draught vessels is in Outer roads, in 8 fathoms, mud, with the old light tower on Thomas point bearing S.W. $\frac{1}{2}$ S., and a poplar tree on Horns point, in line with the State House.

If wishing to enter Annapolis harbour, it is advisable to take a pilot.

YORK RIVER.—In entering this river the chart and lead must be the chief reliance. Keep on the southern side of the channel, as the soundings there decrease gradually, while on the York spit the decrease is sudden.

H.M.S. Royal Alfred anchored in $7\frac{1}{2}$ fathoms water, south of York spit lighthouse.

LIGHT.—Toos Marshes.—This lighthouse is situated about half a mile north of Toos point, the southern entrance point of York river. It is a square, white screw-pile structure, standing in 5 feet water, and exhibiting, at an elevation of 41 feet above high water, a *fixed* white light, visible 11 miles.

Fog signal.—In foggy weather a bell is sounded, giving *two strokes* in quick succession, alternately with a *single stroke* at intervals of *thirty seconds*.

Mobjack Bay.—There is anchorage in this bay, under New point Comfort, in 3 to 4 fathoms water, secure from northerly and north-easterly winds. It is exposed, however, to winds between East and South.

RAPPAHANNOCK RIVER, 130 miles in length, enters Chesapeake bay midway between Potomac and York rivers, and carries a depth of 21 feet water up to about 25 miles from its entrance.

Anchorage may be obtained in 3 to 8 fathoms near the mouth, when west of the line joining Windmill and Stingray points, its north and south entrance points.

If proceeding beyond this, it is advisable to take a pilot, on account of the extensive flats on both shores of the river.

DANGERS.—Rappahannock spit is the chief obstruction on the north side of the approach. No. 9 buoy marking the south-east extreme, and the lighthouse have already been alluded to. Depths under 3 fathoms, extend half a mile southward from the latter, and the same distance southward from Windmill point.

Shoal water extends one mile from the western portion of the shore between Windmill and Mosquito points, its southern extreme, with the

depth of 10 feet on it, bearing W. $\frac{1}{2}$ N., distant $4\frac{1}{6}$ miles from Windmill point lighthouse, and W. by S. $2\frac{1}{4}$ miles from Windmill point. Between this shoal and the latter, the depth of $3\frac{1}{2}$ fathoms reaches within a quarter of a mile of the shore, affording good shelter for coasting vessels.

Stingray point shoal, with 4 to 8 feet water over it, and on which is erected the lighthouse of that name, extends $1\frac{1}{2}$ miles from Stingray point to its north extreme, the latter, with 18 feet water on it, bearing N. by E. $\frac{3}{4}$ E., distant 9 cables from Stingray point lighthouse.

No. 1 buoy, painted black, and placed in 3 fathoms, marks the north extreme of a shoal, extending N. by E. $\frac{3}{4}$ E., $1\frac{2}{6}$ miles from the mouth of Sturgeon creek. The depths on the shoal vary from 5 to 10 feet, and the buoy bears N.W. by W. $\frac{1}{2}$ W., distant 3 miles from Stingray point lighthouse.

Between this buoy and the north-east extreme of Stingray point shoal, the shore should not be approached within three-quarters of a mile.

Directions.—When on the N. $\frac{1}{4}$ E. course up Chesapeake bay, with Windmill point lighthouse bearing N.W. $\frac{3}{4}$ W., distant $4\frac{3}{4}$ miles, steer for it on that bearing, until Stingray point lighthouse bears W. $\frac{1}{4}$ S., thence steer W. by N. $\frac{1}{4}$ N., between Windmill and Stingray points, and anchor as convenient. The latter course passes two-thirds of a mile south of No. 9 buoy, and 4 cables northward of Stingray point shoal, with not less than $4\frac{1}{2}$ fathoms.

The lead should be kept constantly going.

POTOMAC RIVER.*—Vessels of about 25 feet draught, can probably navigate this river for a distance of 30 miles, to near Kettle Bottom shoals; vessels of 21 feet to Alexandria, and Washington, situated 90 miles from its mouth, and light steam vessels as far as Harpers ferry, 50 miles above the capital.

Washington, the capital of the United States, is situated on gently undulating ground on the north bank of the river. In 1880 there were 147,307 inhabitants. This city contains the national observatory, arsenal, and a navy yard with an area of 42 acres.

Anchorage may be obtained in St. Mary river, on the north-east shore of Potomac river 7 miles north-west from point Look-out in 4 to 5 fathoms. Vessels proceeding farther up Potomac river, should take a pilot.

LIGHTS.—**Piney point** lighthouse, on the point of that name, situated on the north-east side of Potomac river, about $11\frac{1}{2}$ miles north-westward from point Look-out, is painted white, and exhibits a *fixed* white light, at an elevation of 34 feet above high water, visible 10 miles.

* See Admiralty plan :—Potomac river, No. 2,857; scale, $m = 0\cdot9$ of an inch.

Fog signal.—During foggy weather, a bell is sounded at intervals of *twenty seconds*.

DANGERS in entering POTOMAC RIVER.—Shoal water extends S. $\frac{1}{4}$ W. 9 cables from point Look-out lighthouse, in which position is placed a red buoy. The west side of the same shoal is marked by another red buoy, No. 4, bearing West, one third of a mile from the same lighthouse.

The north-east shore, between Cornfield point (the west point of Cornfield harbour) and Kits point (the east entrance point of St. Mary river) should not be approached within one mile.

Island bar is the name given to the shoal with 4 to 14 feet on it, extending $1\frac{1}{4}$ miles south-eastward from St. George Island (the western entrance point of St. Mary river). Its south extreme is marked by a red and black horizontally striped buoy, bearing N.W. by W. $\frac{1}{2}$ W., distant $6\frac{1}{2}$ miles, from point Look-out lighthouse.

No. 3 and No. 5 buoys painted black on the south-west side of Potomac river, mark the north-east edge of the shoal water under the depth of 3 fathoms, extending nearly $1\frac{1}{4}$ miles from the south-east, and north-west entrance points of Coan river. No. 5 bears W. $\frac{1}{4}$ S., distant $5\frac{1}{2}$ miles from point Look-out lighthouse.

This shore between these buoys, and Hacks creek (situated 5 miles westward from Smith point) should not be approached within $1\frac{1}{4}$ miles.

Directions for entering Potomac river.—When on the N. by W. $\frac{1}{4}$ W. course up Chesapeake bay, and Smith point lighthouse bears S.W. distant 2 miles, steer N.W. by W. for a distance of nearly $9\frac{1}{2}$ miles, until point Look-out lighthouse bears N. by E. $\frac{1}{4}$ E. distant $2\frac{1}{2}$ miles. Proceed now for the southern part of Cherryfield point bearing N.W. $\frac{1}{8}$ N., until the south extreme of Kits point bears E. by S. $\frac{1}{4}$ S., and the southern part of St. George island bears W. $\frac{1}{2}$ S. In this position, Portobello and Windmill points will be in line bearing North, and should be steered for if proceeding farther up St. Mary river, anchoring as convenient.

From the northward.—When on the S. by E. course through the main channel, and point No Point bears West distant $2\frac{1}{2}$ miles, steer S. $\frac{1}{2}$ W. until point Look-out lighthouse bears W.S.W. distant $2\frac{3}{4}$ miles. Proceed now S.W. until the same lighthouse bears N. by E. $\frac{1}{4}$ E. distant $2\frac{1}{2}$ miles, when steer N.W. by W. as before directed.

PATUXENT RIVER is one of the most frequented harbours in Chesapeake bay, discharging itself into the latter, between Cove, and Cedar points. Drum point on the north-west, and Hog island on the

south-east, may be considered its inner entrance points, distant $1\frac{2}{10}$ miles from each other.

The northern shore, between Cove and Drum points, is high, and the cliffs of a reddish colour. Good anchorage may be obtained south-westward of Drum point, in 10 fathoms and less water. Patuxent river is navigable for vessels of 10 feet draught, for 35 miles, to Nottingham ferry.

DANGERS in entering Patuxent river.—Little Cove point is situated $1\frac{1}{2}$ miles south-westward from Cove point lighthouse, and from the former, a shoal with a depth of 12 feet over it, extends south-eastward, three-quarters of a mile. Its outer extreme bears S. by E. $\frac{3}{8}$ E., distant $1\frac{3}{4}$ miles from the above lighthouse.

Drum point is bold to, but the shore between it, and the last-mentioned shoal, should be given a berth of half a mile.

Sandy point lies $1\frac{2}{3}$ miles westward from Drum point, and on the north side of the harbour; from this point a shoal with 4 feet water on it, extends S.S.E. $\frac{1}{2}$ E. a quarter of a mile, thence the southern edge of a very shallow sand bank, extends in the direction, and to within half a mile of, Drum point.

No. 1 buoy, painted black, marks the north-east extreme of a shoal with 6 to 10 feet on it, extending N.N.E. half a mile from the north extreme of Hog island. From the buoy, Cove point lighthouse is just shut in west of Little Cove point.

Cedar point is bold to, but the shoal water between it and Hog island, extends out to the line joining No. 1 buoy, and the former.

Shoal water, extends a quarter of a mile northward of the point, situated one mile westward of Hog island.

The western side of the same point is steep to, but $1\frac{1}{2}$ miles westward of this point, shoal water extends one-third of a mile from the southern shore.

Directions for entering Patuxent river.—When on the N. by W. course up Chesapeake bay, and Cedar point bears West, distant 2 miles; steer N.W. until the same point bears S. $\frac{7}{8}$ W., distant $1\frac{3}{4}$ miles, and Cove point lighthouse N. by W. $\frac{1}{8}$ W., distant $3\frac{1}{2}$ miles. Now steer W. $\frac{1}{4}$ N., and when the northern point of Hog island bears S. by W. $\frac{1}{4}$ W., distant one mile, stand in for the river on a S.W. by W. $\frac{1}{2}$ W. course, anchoring as convenient.

From the northward.—When on the S. by E. $\frac{1}{2}$ E. course down the bay, and Cove point lighthouse bears W. $\frac{1}{2}$ N., distant $1\frac{1}{2}$ miles, steer S. by W. $\frac{1}{4}$ W., nearly for Cedar point, until the latter bears S. $\frac{7}{8}$ W. distant $1\frac{3}{4}$ miles, whence proceed as before directed.

Anchorage may be obtained under the south side of Cedar point, in 3 to 4 fathoms, good holding ground, sheltered from northerly winds.

Caution is necessary when approaching this point at night, on account of its being so low and steep to.

Vessels may anchor also close under the south side of Cove point, in 3 fathoms, or under the yellow cliffs, in 4 to 5 fathoms, sheltered from N.W. winds.

CHESTER RIVER.—Anchorage in 5 to 7 fathoms, may be obtained in the mouth of this river, between East Neck, and Kent islands.

DANGERS.—**Kent island spit**, extends N.E. 2 miles from the north-east extreme of Love point, with depths over it ranging from 6 to 16 feet. The north-east extreme is marked by a red buoy.

Shoal water extends $1\frac{3}{4}$ miles from the east shore $1\frac{1}{2}$ miles southward of Huntingfield creek. The depths on it vary from 9 to 14 feet and its south-west edge is marked by a black buoy bearing N. $\frac{1}{2}$ W. distant $1\frac{1}{10}$ miles from the above mentioned red buoy.

A bank, with depths under 3 fathoms, extends nearly $1\frac{1}{4}$ miles westward from the west extreme of East Neck island.

Directions.—When proceeding up Chesapeake bay, and having arrived at Lower five-fathom buoy, steer E. by S. $\frac{1}{2}$ S. for $3\frac{1}{2}$ miles, passing $1\frac{1}{2}$ cables northward of Kent island spit buoy, with $4\frac{1}{2}$ fathoms. When the latter bears W. $\frac{1}{4}$ S., distant 4 cables, alter course to S. by W. $\frac{1}{4}$ W., which keep for nearly 3 miles, until the tall poplar tree on Love point bears N.W. $\frac{1}{4}$ W., when anchor as convenient.

System of buoyage.—The buoys in Chesapeake bay, and its harbours, are coloured in accordance with the usual United States system.

Lifeboats.—On the north-east side of the entrance to Chesapeake bay, lifeboats are stationed on the south extremes of Hog, Cobb, and Smith islands.

On the south of the entrance, they are stationed at cape Henry, False cape and at Old Currituck inlet.

The depths given on the shoals, and in the channels of Chesapeake bay, are above the level of mean low water.

Tides and Tidal Streams in Chesapeake bay.—It is high water, full and change, at cape Charles, at 7h. 51m.; springs rise $3\frac{1}{4}$ feet, neaps 3 feet. At cape Henry, at 7h. 55m.; springs rise 3 feet, neaps 3 feet. At Hampton roads, (Old point Comfort), at 8h. 17m.; springs rise 3 feet, neaps $2\frac{1}{2}$ feet, and at Newport News point, at 9h. 10m.;

springs rise $3\frac{1}{2}$ feet, neaps 3 feet.—At Rappahannock river, (Cherry point), at 10h. 5m ; springs rise 2 feet, neaps $1\frac{1}{4}$ feet. At Potomac river (point Look-out), at Oh. 32 m. ; springs rise 2 feet, and neaps $1\frac{1}{4}$ feet. At Patuxent river, at 1h. 16m. : springs rise 2 feet, neaps $1\frac{1}{4}$ feet. At Annapolis, at 4h. 38m. ; springs rise one foot, neaps one foot. At Patapsco river (Bodkin point), at 5h. 42m. ; springs rise $1\frac{1}{2}$ feet, neaps one foot. At Baltimore at 6h. 33m. ; springs rise $1\frac{1}{2}$ feet, neaps $1\frac{1}{4}$ feet.

One mile northward from cape Henry, the direction and rate of the flood and ebb streams, at the period of their greatest strength, are N.W. $\frac{1}{4}$ N., three-quarters of a knot and E. by S. $\frac{1}{4}$ S., three-quarters of a knot per hour, respectively.

Between Willoughby bank and Horse-shoe, (S.E. $\frac{1}{4}$ E. distant three-quarters of a mile from Thimble shoal lighthouse), their corresponding directions and rates, are N.W. by W. $\frac{1}{4}$ W. one knot, and E. $\frac{3}{4}$ S. $1\frac{3}{4}$ knots per hour.

At a position, E. $\frac{3}{4}$ N. distant $1\frac{1}{4}$ miles from Wolf Trap lighthouse, the flood stream, runs during its greatest strength, N.N.E. $\frac{1}{4}$ E. three-quarters of a knot, and the ebb S.S.W. $\frac{1}{4}$ W., one knot per hour.

At $2\frac{2}{3}$ miles N. $\frac{3}{8}$ E. from Cove point lighthouse, the corresponding directions and rates are N.N.E. $1\frac{1}{4}$, and S.S.W. $1\frac{1}{4}$ knots per hour.

In the eastern part of Annapolis outer roads, the flood stream sets N. by W., with a maximum velocity of one knot, the ebb sitting S.S.W. $\frac{1}{4}$ W., at the same rate.

Near cape Henry and Lynn Haven roads, the flood stream turns at Sh. on full and change days. The ebb stream from York and James rivers, sets on to Middle ground, rendering the navigation in that locality dangerous at night, or in thick weather.

As the direction of the streams, varies considerably at different periods, and is also affected by the wind, great care is necessary with regard to the bearing of the lights, as well as to the soundings, when entering Hampton roads, or in the main channel southward of New point Comfort, to avoid being set across the channels.

In strong N.W. winds, the ebb stream runs with great strength to the southward, along the shore southward of cape Henry.

Currents.—The currents on the coast of North Carolina, north of cape Hatteras, are governed by the wind, and are very strong, causing heavy rips, which have every appearance of shoals to those who are not familiar with them. Sometimes the current begins to run quite strong 24 hours in advance of the wind at the same place. The storm, which is almost certain to follow, always sets in from the direction in which the current has started.

Between capes Henry and Hatteras, the current is often found to set in a south-westerly direction; great caution is therefore necessary, when navigating in this locality.

LIGHT.—**Body Island.**—This lighthouse is situated nearly midway between Currituck beach lighthouse, and cape Hatteras; and $1\frac{1}{2}$ miles northward of the entrance to Oregon inlet. The tower 150 feet high, is coloured black and white in alternate horizontal bands, and exhibits, at an elevation of 156 feet above high water, a *fixed* white light, visible 18 miles.

WIMBLE SHOALS.*—About 20 miles N. by E. $\frac{3}{4}$ E. from cape Hatteras, and 3 miles off the shore near Chickamicom, lie Wimble shoals, on which are $3\frac{1}{2}$ fathoms water. Vessels of heavy draught should not approach the land here within 4 miles, or into less than 13 fathoms water, and in thick weather, should not shoal to less than 15 fathoms.

Current.—There is generally a strong current setting towards the shore, and the water shoals very suddenly. With a south wind, the current runs N.N.E., 2 miles per hour, and with a north wind, it sets S.S.W. with the same velocity.

Lifeboats are stationed about 5 miles apart, the whole distance between Currituck beach, and cape Hatteras lighthouses.

LIGHT.—**Cape Hatteras** lighthouse, stands about 2 miles northward of the southern extremity of that cape. The tower is 189 feet high from the base to centre of lantern; it is painted red for 27 feet above the base, and the remainder in black and white spiral bands, exhibiting, at an elevation of 191 feet above high water, a *flashing* white light, the interval between the flashes being *ten seconds*, and visible 20 miles.

CAPE HATTERAS SHOALS, extend S.E. $\frac{2}{3}$ S., $8\frac{1}{4}$ miles, from the low south extreme of cape Hatteras, and consist of three principal sandbanks, known as the Spit, Diamond shoal, and Outer shoals. The former, with 6 feet least water over it, extends S. by E. $\frac{1}{2}$ E., $1\frac{1}{4}$ miles from the cape.

Diamond shoal, with 4 feet on it, is $1\frac{3}{4}$ miles long, in a N.E. by E. $\frac{1}{2}$ E. direction, its eastern side being $3\frac{1}{2}$ miles from the cape. In the shallow passage between the Spit and Diamond shoal, are placed two black and white perpendicularly striped buoys, marking the best water therein, for those locally acquainted, bearing respectively S.S.E. $\frac{1}{4}$ E., distant $3\frac{1}{2}$ miles, and S. $\frac{1}{2}$ E., $3\frac{3}{4}$ miles, from cape Hatteras lighthouse.

* See Admiralty chart :—Albermarle sound to cape Fear, No. 267; scale, $m = 0\cdot16$ of an inch.

Outer shoals, from the south-east portion of cape Hatteras shoals, and are $3\frac{1}{2}$ miles long in an E. by N., and W. by S. direction, within the depth of 3 fathoms; the least water over them being 5 feet.

Between Outer and Diamond shoals, there are numerous patches, with a less depth than 3 fathoms on them, and for the guidance of coasters, two black and white vertically striped buoys, are moored in the deepest water in this passage, bearing respectively S.S.E. $\frac{1}{2}$ E., distant 6 miles, and S. $\frac{3}{4}$ E., $6\frac{1}{2}$ miles, from cape Hatteras lighthouse.

In thick weather, or at night, strangers when in this vicinity, should not shoal to less than 20 fathoms, which depth will be found within $3\frac{1}{2}$ miles of Outer shoals.

Current.—The currents over, and in the vicinity of cape Hatteras shoals, have a velocity of 3 to 5 knots per hour, and are greatly influenced in direction, and force, by the winds. The surface water of the gulf stream, extends to within a short distance of the outer shoals, for some time after a continuation of northerly, and easterly winds.

ANCHORAGE.—Hatteras cove lies immediately westward of cape Hatteras, and affords good anchorage for small coasting vessels, with protection from all winds but those from south to W.N.W. To enter the cove from the southward and westward, bring cape Hatteras lighthouse to bear N.N.E. $\frac{1}{2}$ E., and run for it on that bearing. Anchor in 5 to $4\frac{1}{2}$ fathoms, mud.

A lifeboat is stationed 4 miles westward from cape Hatteras.

Hatteras inlet.*—The bar of this inlet bears about W. by S. $\frac{1}{2}$ S. distant 11 miles from cape Hatteras. It may be recognised by the remarkable round hummock, covered with trees, on the north-eastern side of the entrance; the breakers seldom extend entirely across the channel of the bar, but ordinarily, break on both sides of it.

The courses over the bar cannot be depended on, as the channel is constantly changing, and the buoys are shifted accordingly. The best guides are the breakers, and buoys, the latter being coloured in accordance with the usual system.

A depth of 18 feet may be carried over the bar, and 7 feet through the channel to Pamlico sound. Pilots can be obtained by making signal, and no one should attempt to enter, who is not well acquainted with the bar.

Tides.—It is high water, full and change, at Hatteras inlet, at 7h. 4m.; springs rise $2\frac{1}{4}$ feet, and neaps 2 feet.

* See Admiralty plans:—Hatteras and Ocracoke inlets, No. 2,862, scale, $m = 3\cdot 6$ and $2\cdot 3$ inches.

Ocracoke Inlet.—The south-east part of this inlet, is situated W.S.W., $26\frac{1}{2}$ miles from cape Hatteras.

No stranger should attempt to enter without a pilot, as the channel is constantly shifting. The best guides for crossing the bar, over which 10 feet can be carried, are the breakers, and buoys, the latter being coloured in the usual way.

LIGHT.—Ocracoke.—This lighthouse is erected on the north-east side of, and near the entrance to, Ocracoke inlet. It is a white lighthouse, 65 feet high from the base to centre of lantern, and exhibits, at 75 feet above high water, a *fixed* white light, visible 14 miles.

Tides.—At Ocracoke inlet, it is high water, full and change, at 7h. 4m.; springs rise $2\frac{1}{4}$ feet, neaps 2 feet.

Beaufort Harbour,* is situated, with the south part of the channel over the bar, bearing W. by N. $\frac{3}{4}$ N., distant 7 miles, from cape Look-out lighthouse, and affords shelter from all winds to those locally acquainted, and to vessels entering under the guidance of a pilot.

The bar and harbour, were re-buoyed in December 1879, at which date there was a depth in the channel of 18 feet, the latter being narrow and subject to frequent changes.

Tides.—It is high water, full and change, at fort Macon, entrance to Beaufort harbour, at 7h. 22m.; springs rise $3\frac{1}{2}$ feet, neaps $2\frac{3}{4}$ feet.

CAPE LOOK-OUT.—This cape is very low, not being discernible from the deck in the clearest weather, from a greater distance than 3 miles.

Its south extreme bears S.W. $\frac{3}{4}$ W. $65\frac{1}{2}$ miles distant from cape Hatteras and N.E. by E. $\frac{1}{4}$ E. $85\frac{1}{2}$ miles from cape Fear.

LIGHT.—Cape Look-out lighthouse, is situated N. by E. $\frac{3}{4}$ E., $2\frac{2}{3}$ miles from the extremity of the cape. It is chequer-coloured, black and white, exhibiting, at an elevation of 156 feet above high water, a *fixed* white light, visible 18 miles.

From the westward, this light is obscured when bearing south of W.S.W.

CAPE LOOK-OUT SHOALS extend S.S.E., $7\frac{1}{4}$ miles from the cape of that name, with depths of 2 to 15 feet over them.

The shoalest part with 2 feet, known as Look-out breakers, bears S.S.E. $\frac{1}{2}$ E. distant $4\frac{3}{4}$ miles from the south extreme of the cape, and S. $\frac{3}{4}$ E. 7 miles from cape Look-out lighthouse.

Outer shoals is the name given to three patches, with depths, over them, varying from $4\frac{1}{4}$ to $5\frac{1}{4}$ fathoms, extending E.S.E., $5\frac{1}{4}$ miles, from the southern edge (Bibb shoal) of Cape Look-out shoals.

* See Admiralty plan :—Beaufort harbour, No. 2,864, scale, m = 3.6 inches.

The east extreme of Outer shoals bears S.E. by S., distant $13\frac{1}{2}$ miles from cape Look-out lighthouse, and S.W. $\frac{1}{2}$ W. distant 65 miles from Outer shoals at cape Hatteras. In 7 to 11 fathoms, the colour of the water is dark green; in 5 fathoms a pale, and in 3 fathoms and less a light green.

At night, or in thick weather, do not approach cape Look-out shoals to less than 15 fathoms water.

ANCHORAGE.—Look-out Bight, situated immediately west of cape Look-out affords protection to vessels, from northerly and easterly winds. To run in from the south-westward, when in 8 fathoms water, bring cape Look-out lighthouse to bear E. by N., and steer for it. Anchor about half a mile from the beach, in 5 to 6 fathoms, with the west extreme of the cape, bearing South. Vessels should leave the anchorage directly the wind changes to the southward or westward.

A lifeboat is established on cape Look-out.

CAPE FEAR forms the south extreme of Smith island, and divides the two extensive bights, known as Onslow, and Long bays.

LIGHT.—Frying-pan shoals light vessel, schooner-rigged, painted yellow, with the words *Frying-pan shoals* on her sides, is moored in 10 fathoms water, 2 miles southward of the south-east extreme of Frying-pan shoals, bearing S.S.E. $\frac{1}{4}$ E., distant 19 miles from Bald head lighthouse. The vessel exhibits two *fixed* white lights, each 40 feet above high water, visible 11 miles.

Fog signal.—A fog bell and horn are sounded in thick weather.

FRYING-PAN SHOALS, is the name given to the dangerous rocky ledges, extending S.S.E. 14 miles from cape Fear.

On the northern 10 miles, there is not more than 3 fathoms, and in many places as little as 7 feet water. It dries at low water, in patches for $1\frac{1}{4}$ miles from the cape.

The southern 4 miles of Frying-pan shoals, is composed of several large patches, with from 10 to 18 feet water over them, and with from 4 to 5 fathoms between them.

The shoalest patch on the south-east extreme of Frying-pan shoals, with 13 feet water on it, bears N.W. by N., distant about 2 miles from the light-vessel.

Buoys.—Watch buoy, red and can shaped, is placed in $9\frac{3}{4}$ fathoms, bearing N.N.E., distant three quarters of a mile from Frying-pan shoals light-vessel, in case of the latter breaking drift.

East slue, black and white vertically striped buoy, is moored on the east side of the middle portion of the shoals, and bears S.S.E. $\frac{3}{4}$ E., from Bald

head lighthouse (cape Fear), and distant $7\frac{1}{4}$ miles from the south extremity of the cape.

West slue buoy, similarly coloured, is placed on the west side of Frying-pan shoals, bearing S. by E. $\frac{3}{4}$ E., from Bald head lighthouse, and distant 8 miles from the south extremity of cape Fear.

These black and white buoys, bear from each other N.E. by E. $\frac{1}{2}$ E. and S.W. by W. $\frac{1}{2}$ W., and mark the north-east, and south-west entrances to a passage, with 11 feet water in it, known as the Slue channel, occasionally used by coasting vessels.

Caution.—Masters of heavy draught vessels, in passing these dangerous shoals, should be careful to sound at short intervals of time, not standing into less than 10 fathoms, in a steam vessel, nor into less than 15 to 16 fathoms, in a sailing vessel.

Cape Fear River.*—Enters the Atlantic ocean about 4 miles north-westward of cape Fear, and between Smith and Oak islands.

The commercial city of Wilmington is situated on its east bank, about 25 miles from the entrance.

The channels over the bar, are constantly changing, so that no reliable directions can be given.

The direction of the leading lights, and the positions of the buoys, (coloured in accordance of the United States system), are altered as occasion requires, so as to mark the deepest water, which in 1879 was 12 feet at mean low water, in Bald-head, or Seward channel. No vessel should attempt to enter without a pilot.

LIGHTS.—Cape Fear.—This lighthouse is situated half a mile north-eastward from Bald head, the west extreme of Smith island, and east entrance point of cape Fear river. The white pyramidal tower exhibits, at an elevation of 101 feet above high water, a *fixed* white light, visible 16 miles.

Cape Fear range beacon (front).—is the name given to a stake light, erected S.W. by W. $\frac{1}{2}$ W (in 1881), about half a mile from the preceding lighthouse. It is a *fixed* white light, elevated 30 feet above high water, visible 10 miles.

These lights in line bearing N.E. by E. $\frac{1}{2}$ E. (1881), lead over the bar in 12 feet at mean low water.

Oak island range beacon (front).—This white pyramidal shaped skeleton structure, is situated three quarters of a mile westward of the east extreme of Oak island. It exhibits, from a height of 22 feet

* See Admiralty charts:—Cape Fear river, No. 2,863, scale, $m = 0.9$ of an inch, and cape Fear to Sapelo sound, No. 268, scale, $m = 0.16$ of an inch.

above high water, a *fixed red* light, visible 9 miles, when bearing from N. by W. to E. by N.

Oak island range beacon (rear), is situated a short distance northward of the last mentioned lighthouse, which it resembles in colour and shape, but stands on a square foundation 12 feet high. It exhibits, at an elevation of 42 feet above high water, a *fixed red* light visible 11 miles.

From the westward, this light is obscured, when bearing southward of East.

This and the preceding light in line, lead over that part of the bar across the entrance to cape Fear river, known as Oak island bar.

A lifeboat is established near cape Fear.

Current.—The currents on this part of the coast of North Carolina, are generally governed by the wind. During the summer, when the prevalent direction of the wind is south-west, the current sets north-eastward, parallel to the coast line. If setting in the opposite direction, it is a sure indication of an approaching north-east wind.

Tides.—It is high water, full and change, at Smithville, situated 2 miles northward of the entrance to cape Fear river, at 7h. 19m.; springs rise 6 feet, neaps $3\frac{3}{4}$ feet.

Winyah Bay* is situated in the south-western part of Long bay, in the state of South Carolina. East bank, the name given to the eastern-most of the shoals, obstructing the entrance to Winyah bay, bears N.E. distant 14 miles from the south extreme of cape Romain. The principal passage through these shoals, is known as South-east channel, in which not more than 7 feet can be carried at mean low water, being marked with buoys coloured in the usual manner. Georgetown is situated on the west side of Winyah bay, about 15 miles from the entrance.

LIGHT.—Georgetown.—The lighthouse of this name, is situated one-third of a mile from the south extreme of North island, the east entrance point of Winyah bay. It is painted white, 82 feet from the base to centre of lantern, and exhibits, at 85 feet above high water, a *fixed* white light, visible 15 miles.

Anchorage.—Vessels will find, with south-west winds convenient, and safe anchorage, near the east shore of North island, about $1\frac{1}{2}$ or 2 miles northward of Georgetown lighthouse.

Tides.—It is high water, full and change, at South island (entrance to Winyah bay) at 7h. 43m.; springs rise 4 feet, neaps 3 feet.

* See Admiralty plan :—Winyah bay and Georgetown harbour, No. 2,866, scale, $m = 1\cdot 8$ inches.

A shoal with 17 feet water on it, lies with its east extreme distant 5½ miles from the nearest shore, and bearing N.E. ½ E., 11 miles from the south extreme of cape Romain.

CAPE ROMAIN, situated about 30 miles north-eastward of the entrance to Charleston harbour, is very low, and when seen from a distance, appears like a sandbank left dry by the tide. Cape Romain will be readily known during the day by two towers, the old one being 65 feet high, and whitewashed.

LIGHT.—Cape Romain lighthouse, stands on Racoon cay, and 1½ miles north-westward of the south extremity of the cape. The tower, 150 feet high, is coloured red, and exhibits a *flashing* white light *every minute*, elevated 154 feet above high water, and visible 18 miles.

CAPE ROMAIN SHOALS,* with 6 feet least water over them, extend S.E. by E. 3½ miles from cape Romain. The south-east side of these shoals is steep to; with moderate north-east and west winds, the sea does not break upon them, but with winds from S.W. round by south to east, they are shown by the sea breaking upon their seaward side. Vessels of heavy draught should not approach cape Romain within 8 fathoms water, there being a five-fathom bank eastward of the shoals above mentioned.

Buoys.—A can buoy painted red and black in horizontal stripes, and with the letters C. R., is placed in 5½ fathoms, three-quarters of a mile south-eastward of the outer of cape Romain shoals, and bearing S.E. by E. from cape Romain lighthouse.

A bell buoy, coloured black and white in vertical stripes, is moored on the north-east side of the shoals, in 17 feet of water, bearing S.E. by E. ½ E., distant about 4½ miles from the same lighthouse.

A nun buoy, similarly coloured, is placed on the south-west side of cape Romain shoals, in 19 feet water, bearing S.E. ½ S., distant about 4 miles from the same lighthouse, and S.W. ¼ W. from the bell buoy. These two buoys, mark the entrances to a passage for coasters, across the shoals, known as Slue channel.

Anchorage.—There is good anchorage during northerly winds, south-west of cape Romain lighthouse, in not less than 3 fathoms water.

Bull's bay affords good anchorage in 3 to 4 fathoms, northward of the north-east extreme of Bull's island, the south-west entrance point. The channel over the bar has a depth of 13 feet at mean low water, and is clearly defined by the breakers on either side. Strangers should not enter without a pilot.

* See Admiralty chart:—Cape Fear to Sapelo sound (with plans of cape Romain inlet, and Bull's bay), No. 268, scale, m = 0·16 inches.

Danger.—Shoal water, with depths under 3 fathoms extends S.S.E. $\frac{1}{4}$ E., $4\frac{1}{3}$ miles from the central part of Bull's island. A red and black horizontally buoy is placed two-thirds of a mile south-east of these breakers, in 5 fathoms water, bearing S. by E. from Bull's bay lighthouse, and S.W. $\frac{3}{4}$ S. from cape Romain lighthouse.

LIGHT.—Bull's bay lighthouse is situated on the north-east extreme of that island. The white tower rises from the keeper's white dwelling, and exhibits, at 49 feet above high water, a *fixed* white light, visible 12 miles. The back ground is wooded.

Rattlesnake shoal, with 6 feet least water over it, is $1\frac{1}{2}$ miles long in an E. $\frac{1}{2}$ N. and W. $\frac{1}{2}$ S. direction, and a quarter of a mile broad, within the depth of 12 feet. The eastern extreme of the shoalest part bears E. $\frac{1}{4}$ N., distant 7 miles from fort Sumter.

The east and west sides of this danger are each marked by a red and black horizontally striped buoy, bearing respectively S. $\frac{1}{4}$ W., and S.S.W. $\frac{3}{4}$ W. from the north-east extreme of Long island, and N. $\frac{3}{8}$ E. and N.W. by W. $\frac{3}{8}$ W. from Rattlesnake shoal light vessel.

CHARLESTON* is one of the most ancient cities in the United States. It is situated on a low tongue of land formed by the meeting of Cooper and Ashley rivers. The harbour is open to easterly winds, and vessels are exposed to storms from that quarter, which occur from the end of July to the middle of September. Two breakwaters, known as North and South jetties, are in course of construction for the improvement of Swash channel, the former extending in a south-easterly direction from Sullivan's island, and the latter in an easterly direction from the northern part of Morris island.

The entrance to Charleston harbour is obstructed by a bar, which at the present time (1882) is crossed by those locally acquainted in three places, known as Swash, Main Ship (or Pumpkin hill), and South channels. The former should not be used by strangers until the completion of the above mentioned jetties. On the bar in Main Ship channel the depth is 11 feet at mean low water.

Rebellion road is situated between forts Moultrie and Ripley, and afford good anchorage in 5 to 7 fathoms water.

LIGHTS.—Rattlesnake shoal light vessel is moored in $5\frac{1}{2}$ fathoms, $1\frac{1}{3}$ miles south-eastward of Rattlesnake shoal. She has two masts, with oval day marks at each masthead, is schooner rigged, painted white, with the words *Rattlesnake shoal* on each side, and exhibits from each mast, at an elevation of 44 feet above high water, a *fixed* white light, both being visible 12 miles.

* See Admiralty chart:—St. Helena sound to Charleston harbour, No. 2,861; scale, $m=0.9$ of an inch; and plan of Charleston harbour, No. 2,806, scale, $m=2.4$ inches.

Fog signal.—During foggy weather a bell is sounded.

Charleston (main light).—This lighthouse is erected on the southern part of Morris island. It is coloured black and white in horizontal bands, and exhibits, from an elevation of 158 feet above high water, a *fixed* white light, visible seaward 18 miles.

Morris island range beacon (front).—Near the south-east extreme of Morris island, and north-east entrance point of Lighthouse inlet, is erected a pyramidal shaped red tower, which exhibits, at the height of 20 feet above high water, a *fixed red* light, visible 9 miles.

Morris island range beacon (rear) is the name given to the black skeleton structure, situated about half a mile W. by N. $\frac{1}{2}$ N. from the last mentioned light. It exhibits, from an elevation of 40 feet above high water, a *fixed red* light, visible 11 miles seaward, between the bearings of N.N.W. $\frac{5}{8}$ W., and S.W. by W. $\frac{3}{4}$ W. These lights in line lead over the bar.

Fort Sumter lighthouse is attached to that fort, situated three-quarters of a mile northward from Cummings point. The brown framework tower exhibits, at 57 feet above high water, a *fixed* white light, visible 12 miles.

Fog signal.—During foggy weather, a bell is struck *two blows* in quick succession, at intervals of *fifteen seconds*.

Sullivans island range beacon (front).—This white beacon stands 133 yards S.E. from the south-east extreme of fort Moultrie, situated near the west extreme of Sullivans island. It exhibits, from an elevation of 26 feet above high water, a *fixed red* light, visible 10 miles, in full brilliancy between the bearings of north and N. by W.

Sullivans island range beacon (rear), is the name given to the white beacon, bearing N. $\frac{1}{2}$ W. distant 433 yards, from the last mentioned light. It exhibits from an elevation of 57 feet above high water a *fixed red* light, visible 13 miles.

These lights when in line, N. $\frac{1}{2}$ W. lead through a portion of Main Ship channel.

Fort Ripley shoal (Middle ground).—This lighthouse is erected near the west extreme of fort Ripley shoal, situated between Folly island and South channels. It is a yellow hexagonal screw-pile structure, exhibiting, from an elevation of 49 feet above high water, a *fixed red* light, visible 12 miles.

Fog signal.—In foggy weather, a bell is sounded every *ten seconds*.

Buoys in MAIN SHIP CHANNEL.—Sea buoy can shaped black and white in vertical stripes, marked with letter C., moored in

5 fathoms, with Morris island leading lights in one, bearing W. by N. $\frac{1}{2}$ N., about one mile eastward from the bar.

Outer bar nun buoy, similarly coloured, on the fairway course, and on the eastern edge of the bar, in 18 feet of water.

Middle can buoy, black, and marked No. 1, placed in 11 feet water on the western part of the bar, and south of the fairway course.

Junction bell buoy, black and white perpendicularly striped, with bell placed in 17 feet water, at junction of Main ship, and South channels with Sullivans island lights in one, bearing N. $\frac{1}{2}$ W.

Pumpkin hill red can buoy, marked No. 2, placed in 19 feet water, on the west side of the shoal of that name, with Morris island leading lights bearing W. by N. $\frac{5}{8}$ N.

South jetty black can buoy, marked No. $1\frac{1}{2}$, about half a mile southward of South jetty, moored in 16 feet water on the west side of the channel.

No. 3 buoy black and nun shaped, placed in 20 feet water (1882) over the foundation of South jetty under construction.

Cummings point No. 5, black can buoy, placed in 20 feet of water, on the north-east side of Cummings point shoal, and bearing S.E. by E. from fort Sumter.

Sumter shoal No. 7, black, can shaped, placed in 11 feet water, on the north edge of that shoal and bearing W.N.W., distant 7 cables from fort Sumter.

Lower Middle ground, red and black horizontally striped buoy, placed in 22 feet water, marking the south-east extreme of fort Ripley, and Middle ground shoals, with 6 feet least water over them.

Upper Middle ground red can buoy, in 25 feet water, marking the south-west side of the shoal of that name. It bears south from Castle Pinckney beacon.

Battery point red and black horizontally striped nun buoy, in 18 feet water, marking the south-east extreme of the shoal water from Battery point, which separates Cooper and Ashley rivers.

Directions for entering Charleston harbour.—In approaching Charleston bar for Main Ship or Pumpkin Hill channel, keep the lead going, and when in 5 fathoms water, bring the two lighthouse beacons on Morris island in line, bearing W. by N. $\frac{1}{2}$ N. and steer in with them so, over the bar, passing close on either side of Sea buoy, southward of Outer bar buoy, and northward of Middle buoy. When abreast the latter, steer W. $\frac{1}{2}$ S. for junction bell buoy, pass close

south and west of it, and steer for Sullivans island leading lights in line bearing N. $\frac{1}{2}$ W. Pass westward of Pumpkin hill buoy, and having arrived abreast No. 1 $\frac{1}{2}$ buoy steer about N.E. by N. for No. 3. Pass eastward of this buoy and steer N.N.W. until Sullivans island lighthouses are again in line, which steer for, until Fort Ripley lighthouse opens north of fort Sumter, when proceed N.W. $\frac{1}{2}$ W. until the latter bears south. Now steer west, passing north of No. 7 buoy, and southward of Lower and Upper Middle ground buoys. When abreast of the latter, haul to the northward, and anchor off the city of Charleston. If wishing to anchor in Rebellion road, continue the N.W. $\frac{1}{2}$ W. course, taking up a berth as convenient.

Caution.—The shifting character of the sands composing Charleston bar, particularly after south-east gales, prevents anything like permanence in the channels.

Anchorage.—Good holding ground in 5 fathoms, at mean low water, will be found seaward of the bar, with the leading lighthouses on Morris island in line.

Tides.—It is high water, full and change, in Charleston harbour, at 7h. 24 m.; springs rise 5 $\frac{1}{2}$ feet, neaps 4 $\frac{1}{2}$ feet.

North Edisto river, the entrance to which, is about 20 miles south-westward from Charleston harbour, is entered by two passages over the bar, known as South and East channels, the former having a depth of 12, and the latter of 10 feet at low water. They are buoyed in accordance with the United States system of buoyage; red buoys on starboard, black on port hand, and black and white vertically striped buoys, in mid-channel.

Like all the river mouths between it, and Chesapeake bay, the bar is subject to frequent changes; consequently strangers should take a pilot.

Tides.—It is high water, full and change, in North Edisto harbour, at 7h. 10m.; springs rise 6 $\frac{1}{2}$ feet, neaps 5 $\frac{1}{4}$ feet.

St. Helena sound.—The shoals of St. Helena bar extend nearly 6 miles seaward from the land, which is low and difficult to distinguish, and no stranger should attempt to enter the sound without a pilot. After a prevalence of strong north-westerly winds there are usually 2 or 3 feet less water on the bar than the general average, which is 16 feet.

LIGHT.—**Hunting island.**—This lighthouse, is situated three-quarters of a mile, from the north-east extreme of that island, the south-west entrance point of St. Helena sound. It is painted white and black, and exhibits at an elevation of 136 feet above high water, *flashing* white light, the flashes occurring every *thirty seconds*, visible 17 miles.

Tides.—It is high water, full and change, in St. Helena sound, at 7h. 8m.; springs rise 6 $\frac{1}{2}$ feet, neaps 5 $\frac{1}{4}$ feet.

PORT ROYAL SOUND*, formed by the confluence of Broad and Beaufort rivers, affords good anchorage about a mile north-westward of the entrance points, which are Bay point on the north-east, and Hilton head on the south-west. The two principal passages, in the approach to Port Royal sound, are on either side of the shoal, named Martins Industry, and are known as South-east, and South channels. The former has a depth of 18, and the latter 16 feet, at mean low water, the seaward entrances to which, are $8\frac{1}{2}$ miles south-eastward of the entrance points of the sound. The breakers are generally constant, and to a vessel fairly entered in either channel, afford an excellent guide.

LIGHTS.—**Martins Industry** light vessel, is moored in 8 water, about $1\frac{1}{4}$ miles south-eastward of Martin's Industry shoal, with Tybee lighthouse, bearing W. by S. $\frac{3}{4}$ S., distant $15\frac{1}{2}$ miles. She exhibits two *fixed* white lights, each at a height of 44 feet above high water, visible from a distance of 12 miles.

Fog signal.—A fog bell and horn are sounded in thick weather.

Hilton head range beacon (front).—This lighthouse is erected near the middle of the south-east coast of Hilton head island.

The tower is attached to the keeper's white dwelling, and exhibits at an elevation of 37 feet above high water, a *fixed red* light, visible 11 miles, when in, or nearly in line, with the following light.

Hilton head range beacon (rear), is the name given to the white skeleton structure, situated W. $\frac{3}{4}$ N., about a mile distant from the last-mentioned lighthouse. It exhibits at an elevation of 98 feet above high water, a *fixed red* light, visible 16 miles, when seen in, and nearly in line with the last-mentioned lighthouse. These lights in one, bearing W. $\frac{3}{4}$ N., lead through south-east channel.

Paris island range beacon (front).—This white pyramidal shaped skeleton beacon, is erected on the south-east extreme of Paris island. It exhibits at a height of 52 feet above high water a *fixed* white light visible 12 miles, when in, or nearly in line with the following light.

Paris island range beacon (rear).—N.N.W. $\frac{1}{2}$ W., one mile distant from the last-mentioned light, is situated a pyramidal skeleton beacon, painted black and white, which exhibits at an elevation of 130 feet above high water, a *fixed* white light visible 17 miles, when in, and nearly in line with the last mentioned light.

These two lights in line, bearing N.N.W. $\frac{1}{2}$ W., lead from the mouth of Beaufort river, to the north-west entrance to South-east channel.

* See Admiralty chart :—Savannah river to St. Helena sound, including Port Royal, Calibogue sound, and Broad river, No. 2,860, scale $m=1\cdot 2$ inches.

DANGERS and buoys in entering **PORT ROYAL SOUND**.—**Martins Industry**.—This shoal as before stated, separates South-east from South channels; it has almost the shape of an equilateral triangle the length of each side being about 3 miles. The least water over it is 6 feet, and the south-west, and north-west extremes are each marked by a red nun buoy (No. 2 and No. 4) placed in $3\frac{1}{4}$ fathoms, and bearing respectively W. $\frac{1}{2}$ N. $2\frac{1}{2}$, and N.W. $\frac{1}{2}$ N., $3\frac{4}{5}$ miles, from Martins Industry light vessel.

North-east breakers, with 7 feet least water over them, lie on the north side of South-east channel, the south-west edge being marked by a red nun buoy (No. 2), bearing N. by W. $\frac{3}{4}$ W., distant $2\frac{3}{4}$ miles, from the same light vessel.

Gaskin banks, is the name given to the shoal water, extending $8\frac{1}{2}$ miles south-eastward from the central part of Hilton head island. There is as little as 2 feet in the middle part of this shoal, and its south extreme is marked by a black nun buoy (N. 1), placed in 3 fathoms, and bearing S.W. by W. $\frac{7}{8}$ W., distant 3 miles from Martins Industry light vessel.

Joiners bank, awash at low water, extends $2\frac{1}{2}$ miles south eastward from the east extreme of Hilton head island.

On its north-east side in $3\frac{1}{2}$ fathoms, is placed a black nun buoy, marked No. 1, and bearing S.E. $\frac{1}{2}$ E. from Hilton head wharf.

Fishing Rip, with 8 feet least water over it, is separated from Joiners bank, by a passage half a mile broad, with a depth of $4\frac{1}{4}$ fathoms. Fishing Rip is a mile long in an E.S.E. and W.N.W. direction, each extreme being marked by a black buoy Nos. 3 and 5 bearing respectively S. by E. $\frac{7}{8}$ E., $2\frac{6}{7}$ miles, and South, $2\frac{1}{4}$ miles, from Bay point wharf.

Middle shoal with 16 feet water over it, lies W. $\frac{1}{2}$ N., one mile from Bay point, its south extreme being marked by a red and black horizontally striped can buoy, bearing W. by S., from Bay point wharf.

Paris island spit, with one to 9 feet water over it, extends in a S. by E. direction, $1\frac{1}{2}$ miles from the south-east extreme of Paris island. At this position is placed a similar buoy, bearing N. by E. from Hilton head wharf.

In addition to the above mentioned buoys, marking dangers, there are seven black and white vertically striped buoys, moored in mid-channel as follows :—

Sea buoy, can shaped, with the letters P.R. on it, placed in 5 fathoms N.E. $\frac{1}{2}$ E., $3\frac{3}{4}$ miles from Martins Industry light vessel.

Mid-channel, can buoy, in $3\frac{1}{2}$ fathoms N.N.E. $\frac{3}{4}$ E., $3\frac{1}{2}$ miles from the same.

Turning point, can shaped in $3\frac{1}{2}$ fathoms, moored at the intersection of Hilton head and Paris island leading lights.

These two buoys mark the fair way of South-east channel, and the following two, that of South channel.

Sea buoy, nun shaped, marked with the letters P.R. in $6\frac{1}{4}$ fathoms W. by S. $\frac{5}{8}$ S., three-quarters of a mile from Martins Industry light vessel.

Mid-channel can buoy, N.N.W. from the same.

The remaining two fairway buoys, are placed in Main channel, with Paris island leading lights in line, bearing N.N.W. $\frac{1}{2}$ W., distant $5\frac{3}{4}$, and $4\frac{1}{10}$ miles, from Bay point wharf.

Directions for entering PORT ROYAL SOUND.

—**By South-east channel.**—Having made out, and arrived at, Sea fairway buoy, Hilton head island leading lights, should be seen in line with each other, and with Turning point, and Mid-channel fairway buoys, bearing W. $\frac{3}{4}$ N. Proceed for them, and when near Turning point buoy, Paris island leading lights will be in line with each other, and with the two fairway buoys in Main channel bearing N.N.W. $\frac{1}{2}$ W. Steer for them on this bearing, until about one cable eastward of No. 3 buoy of Fishing Rip, when if wishing to anchor north-eastward of Hilton head wharf, steer N.W. by W. for 3 miles, and anchor in 6 to 8 fathoms. If intending to anchor in the mouth of Peaufort river, continue steering for Paris island leading lights in line N.N.W. $\frac{1}{2}$ W., and when Bay point bears from E.S.E. to S.E., anchor in about 6 fathoms.

Entering by South channel.—Martins Industry light vessel, should not be brought to bear eastward of N.E. by E., until Sea fairway buoy is discernible, and is brought to bear N.N.W. $\frac{1}{4}$ W., nearly in line with No. 2 red buoy. Proceed on that course for these buoys, until abreast of the latter, which pass close westward of, and steer N. by E. passing about $1\frac{1}{2}$ cables westward of No. 4 red buoy, until in Main channel with Paris island leading lights in line, bearing N.N.W. $\frac{1}{2}$ W. Steer for these lights, and proceed as before directed.

The depths given in the channels, and on the banks, are above the level of *mean* low water.

Tides.—It is high water, full and change, at Port Royal sound, (Station creek), at 7h., 32m.; springs rise $7\frac{1}{4}$ feet, neaps $6\frac{1}{2}$ feet.

SAVANNAH RIVER divides the states of South Carolina and Georgia. Its entrance is situated about 65 miles south-westward of Charleston harbour, and 213 miles northward from cape Canaveral, and

is obstructed by a bar, parts of which are nearly dry at low water springs, extending eastward $4\frac{1}{2}$ miles from Tybee point, the north-east extreme of Tybee island, and south entrance point of the river.

The bar is crossed by two channels, known as Main and North Slue channels, the former having a depth of 17 feet, and the latter 14 feet at mean low water.

Braddock point, the south-west extreme of Hilton Head island, may be considered the north entrance point of Savannah river, as also the east entrance point of Calibogue sound.

Tybee roads situated under the north side of Tybee point afford good anchorage for strangers, in $3\frac{1}{2}$ to 4 fathoms water. Vessels proceeding further should take a pilot.

The city of Savannah is built upon the south bank of the river, about 15 miles north-westward from Tybee point, ranking in commerce among the first on the South Atlantic coast. Here is situated a dry dock 345 feet long, with 18 feet water over the sill. A depth of 18 feet can be carried to within 2 miles, and 15 feet to the wharves of the city, *at high water*. Savannah river is navigable for steam vessels of light draught, as far as town of Augusta, situated about 280 miles from the entrance.

LIGHTS in the entrance to SAVANNAH RIVER.—**Tybee** lighthouse, near the north-east extreme of Tybee island, is a white octagonal building, 134 feet high, and exhibits, at 150 feet above high water, a *fixed* white light, visible 18 miles.

Tybee beacon is situated about half a mile E. by S. $\frac{1}{2}$ S. from Tybee lighthouse; it is a white skeleton structure, exhibiting at an elevation of 28 feet above high water, a *fixed* white light, visible seaward 10 miles, between the bearings of W. by S. and N.W. $\frac{1}{2}$ N. These two lights in line W. by N. $\frac{1}{2}$ N., lead over Savannah river bar.

Daufuskie island range beacon (front).—This lighthouse is erected near the north-east extreme of the island of that name, situated on the west side of Calibogue sound. The white tower, exhibits at an elevation of 22 feet above high water, a *fixed* white light, visible 9 miles.

Daufuskie island range beacon (rear), is the name given to the lighthouse, situated N. $\frac{3}{4}$ W. 750 yards distant from the preceding light. The lantern is attached to the keeper's white dwelling, and exhibits from an elevation of 65 feet above high water, a *fixed* white light visible 17 miles.

These two lights in line, bearing N. $\frac{3}{4}$ W., lead from Tybee roads, to Calibogue sound.

Cockspur island beacon, is erected on the sand, dry at low water, about half a mile eastward of the east extreme of Cockspur island. It is a conical, white tower, which exhibits, at 25 feet above high water, a *fixed* white light, visible 10 miles.

Oyster Beds beacon.—This lighthouse is situated on the bank of that name, half a mile northward of Cockspur island. The white pyramidal tower, exhibits, at an elevation of 35 feet above high water, a *fixed red* light, visible 11 miles.

Tybee Knoll cut range beacon (front), is the name given to the lighthouse, erected upon the east extreme of Long island. The lantern is attached to the keeper's white dwelling, and at an elevation of 24 feet above high water, exhibits a *fixed* white light, visible 10 miles.

Tybee Knoll cut range beacon (rear).—This lighthouse is situated W. $\frac{3}{4}$ S., one-third of a mile distant from the last mentioned light. The white skeleton tower exhibits from an elevation of 47 feet above high water, a *fixed* white light visible 11 miles.

These two lights in line bearing W. $\frac{3}{4}$ S., lead from Tybee roads to Savannah river.

BUOYS in approaching TYBEE ROADS.—The following buoys mark Main channel:—

Automatic whistle, painted black and white in vertical stripes, with the letter T, placed about three-quarters of a mile eastward of the bar, in 6 fathoms water, with Tybee lighthouse distant $5\frac{5}{8}$ miles, in line with Tybee beacon bearing W. by N. $\frac{1}{2}$ N.

On the north-east side of the shallow bank extending south-eastward from Tybee point, are placed three black buoys, numbered 1, 3 and 5, bearing respectively from Tybee lighthouse E.S.E., $4\frac{1}{2}$, E. by S. $\frac{1}{2}$ S., $2\frac{1}{10}$, and E. $\frac{3}{4}$ N. seven-eighths of a mile.

A bell buoy, painted red with the figure 2, is placed in 19 feet water, just northward of the line of Tybee lighthouse and Tybee beacon in one bearing W. by N. $\frac{1}{2}$ N., the former being distant $3\frac{6}{10}$ miles.

Tybee Knoll spit.—This bell buoy is painted red and black in horizontal stripes, and placed in 11 feet water, on the east extreme of the shoal of that name, separating Tybee roads from Savannah river main channel. The buoy bears N. by W. $\frac{1}{2}$ W. distant half a mile from Tybee lighthouse.

Directions for entering Tybee roads by Main channel.—Bring Tybee lighthouse and Tybee beacon in line, bearing W. by N. $\frac{1}{2}$ N., and proceed for them thus, passing on either side of the automatic whistling buoy, and half a mile northward of No. 1. This course

leads close southward of No. 2 red bell buoy, which having past well westward of, steer N.W. by W. $\frac{1}{4}$ W., passing a quarter of a mile north-eastward of No. 3 black buoy. When Tybee beacon bears W. by S. $\frac{1}{4}$ S., in line with No. 5 buoy, alter course to W. $\frac{1}{2}$ N. for Tybee roads, and anchor with Tybee lighthouse bearing from S. by E., to S.S.E.

The depths given, are above the level of mean low water; spring tides fall half a foot lower.

Tides.—It is high water full and change, at Savannah river (Fort Pulaski), at 7h. 20m.; springs rise 8 feet, neaps 7 feet.

Wassaw sound,* situated 8 miles south-west of the entrance to Savannah river, has 12 feet at mean low water on the bar, but the channel is too intricate for strangers.

Doboy sound† is situated N. by W. $\frac{1}{2}$ W., 180 miles from cape Canaveral. There is a depth of 13 feet in the channel across the bar, which is buoyed. The anchorage is from $3\frac{1}{2}$ to 6 fathoms, is abreast Sapelo lighthouse and beacon. No stranger should enter without a pilot.

LIGHTS.—Sapelo Main light.—This lighthouse is situated near the south-west extreme of Sapelo island, the north-east entrance point of Doboy sound. It is 70 feet high, painted red and white in horizontal stripes, and exhibits, at 79 feet above high water, a *fixed* white light, varied by a *white flash every forty-five seconds*, visible 14 miles.

Beacon.—220 yards south-east, and in front of the above, is a brown beacon on a skeleton frame, which shows, at 21 feet above high water, a *fixed* white light, visible 9 miles.

Wolf island range beacon (front).—This lighthouse is situated three-quarters of a mile from the north-east extreme of Wolf island, the south-west entrance point of Doboy sound. It is an open framework structure painted brown, exhibiting at an elevation of 30 feet above high water a *fixed* white light, visible 10 miles.

Wolf island range beacon (rear), is the name given to the keeper's white dwelling with lantern attached, erected a short distance westward of the last-mentioned light. It exhibits at a height of 38 feet above high water, a *fixed* white light, visible 11 miles.

St. Simon's sound is situated about 16 miles south-westward from Doboy sound, and contains good anchorage in from 4 to 5 fathoms water, one mile westward from St. Simon's lighthouse.

* See Admiralty chart:—Wassaw, &c., sounds, No. 331, scale $m = 0\cdot98$ of an inch.

† See Admiralty chart:—Sapelo sound to St. Andrew sound, No. 852, scale, $m = 0\cdot9$ of an inch.

A depth of 15 feet at mean low water may be had in the channel over the bar, the eastern side of which, is $5\frac{1}{4}$ miles distant from the entrance points of the sound. The buoys are coloured in accordance with the United States system of buoyage, that is, black and white vertically striped buoys are placed in mid-channel, those coloured red with even numbers mark the starboard, and black with odd numbers, the port side of the channel in entering. No one should attempt to take a vessel in without a pilot.

LIGHTS.—**St. Simon's** lighthouse is situated on the south-west extreme of the island of that name, the north entrance point of St. Simon's sound. It consists of a white conical tower, attached to the keeper's red two-storey dwelling, exhibiting, at 108 feet above high water, a *fixed* white light, varied by alternate *red and white flashes, every minute*, visible 16 miles.

Little Cumberland island.*—This lighthouse is erected on the north extreme of the island of that name, the south entrance point of St. Andrew's sound, situated between St. Simon's sound and St. Mary's river. It is painted white, and exhibits a *fixed* white light, at an elevation of 78 feet above high water, visible from a distance of 14 miles.

Tides.—It is high water, full and change, at St. Simon's sound, at 7h. 43m.; springs rise $8\frac{1}{4}$ feet, neaps $6\frac{3}{4}$ feet.

Lights.—**Amelia island main light.**—This lighthouse is situated 2 miles southward from the north extreme of Amelia island the south entrance point of St. Mary's river. It is painted white, and attached to the keeper's dwelling of the same colour, exhibiting at 112 feet above high water, a *flashing white* light, the intervals between the *flashes* being *one and a half minutes*, visible 13 miles.

St. John's river lighthouse, is situated on the western part of the south entrance point to that river. The tower coloured red, is attached to the keeper's white dwelling, and exhibits, at 84 feet above high water, a *fixed* white light, visible 15 miles.

St. Augustine lighthouse, is erected near the north extreme of Anastasia island, 130 miles southward of Tybee lighthouse (Savannah river) and 94 miles northward from the lighthouse on cape Canaveral. It is painted white, and black with spiral bands, and exhibits, a *fixed* white light, varied by a *white flash* at intervals of *three minutes*, at an elevation of 165 feet above high water, and visible 19 miles.

* See Admiralty chart:—St. Andrew sound to St. John river, No. 853, scale, $m=1\cdot 9$ of an inch.

CAPE CANAVERAL.*—This low cape is situated in lat. 28° 28' N., long 80°. 31½' W., and bears about N.W. ¼ W., distant 103 miles, from the north-west shoal on Little Bahama bank.

LIGHT.—Cape Canaveral lighthouse stands upon the north-east extreme of the cape, and is painted in white, and black, horizontal bands, with white at the top. It exhibits at an elevation of 139 feet above high water, a *flashing white* light, the flashes occurring *every minute*, visible 18 miles.

The keeper's dwelling and old light-tower, both painted white, stand close to the lighthouse.

DANGERS.—**Hetzl shoal** with 8 feet least water over it, bears N.N.E. ½ E., distant 11 miles from cape Canaveral lighthouse. This shoal within the depth of 3 fathoms, is three-quarters of a mile long in a N.E. direction and half a mile wide.

Ohio shoal with 15 feet water on it, bears N.E. ¾ N., 11½ miles distant from the same lighthouse, and one mile eastward from Hetzel shoal.

An automatic whistle buoy is placed in 9 fathoms water, East three-quarters of a mile from Ohio shoal.

The Bull, on which there is a depth of 15 feet, bears N.E. ¾ E., distant 6½ miles from cape Canaveral lighthouse.

Breakers in bad weather lie 1½ miles northward from The Bull.

A shoal with 15 feet water over it bears N.N.E. ¾ E. distant 6½ miles from the same lighthouse.

From this shoal, a series of shoal patches, extends in a N.W. by W. direction to the shore.

South-east shoal, parts of which are constantly breaking, extends S.E. by E., 5 miles from cape Canaveral lighthouse.

A patch with 11 feet water on it, lies S.E. by E. ¼ E. 6½ miles from the same lighthouse, and is separated from South-east shoal by a channel a mile wide and depth of 4 fathoms.

The above shoals are especially dangerous because of being steep to, and not breaking except in heavy weather. In approaching them, vessels should not shoal to less than 20 fathoms, which depth will be found about 22 miles from the land.

* See Admiralty chart :—Sapelo sound to Florida and Providence channels, No. 269, scale, d = 4·0 inches.

Anchorage.—A black and white vertically striped buoy, is placed in 2 fathoms water, south-westward of cape Canaveral, as a guide to vessels seeking shelter from north, and west winds. The buoy is moored with the lighthouse bearing N.E. by N., and vessels intending to anchor, should from the south-westward, steer for the buoy in line with the lighthouse, and anchor in from 3 to 4 fathoms. half a mile S.W. by S. from the buoy.

Tides.—It is high water, full and change, at cape Canaveral, at 6h. 0m. ; the ordinary rise above mean low water being 4 feet.

The depths on cape Canaveral shoals are given above mean low water.

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